SSUE OF FEBRUARY, 1949

AMERICAN GAS ASSOCIATION MONTHLY

AMERICAN GAS ASSOCIATION

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SUPER-VISION -- SUPERIOR VISION

AMERICAN GAS ASSOCIATION
FOREMAN'S REMINDER

As a supervisor you belong to a class of men who have been chosen to lead others. You were selected because it was believed you had superior vision; that is, ability to see ahead; to plan the job; to lead the way; to understand human behavior and control it; to inspire men and win their best efforts.

With such a leader morale is high.

Accidents result from failures, either physical or human. Failures will be decreased to a minimum with high grade planning of the job, effective training of employes and that kind of leadership which builds better man. With failures at a minimum, accidents are reduced in like proportion and the productivity of each worker is increased.

In the utility industry, accidents are usually the only failures recorded. Because responsibility to prevent failures rests upon supervision, it is apparent that the accident rate of any group can be accepted as a reliable measure of the capability of the leader. In fact, its use for that purpose was recognized years ago by the American Engineering Council in a nation-wide survey undertaken to establish the relationship between productivity and safety. It showed that "When the accident rate was high, productivity was low and conversely when the accident rate was low, the production rate was high."

No supervisor can deny responsibility for the efficiency of his group. Quality and quantity of production are directly dependent upon the ability of the supervisor to forestall failures through superior vision; building greater skills in his men and by creating a high degree of loyalty, enthusiasm, and job interest in his group. With that kind of leadership, accidents are rare.

Yours for Safety,

W. F. Brown

W. F. Brown
Chairman
Accident Prevention Committee

● Sample from current series of foreman's reminders sponsored by the A. G. A. Accident Prevention Committee. Full story on pages 16 and 17.

Make safety your personal responsibility!—that is the appeal which President Hendee made to the heads of all member gas companies in January. . . . Help us, he said, to cut frequency and severity of accidents by one quarter this year. . . . In view of safety's important role in fostering and maintaining good employee and public relations, this issue of the MONTHLY lays heavy stress on accident prevention. A full-page foreman's reminder, a two-page feature on accident prevention work, and Mr. Mattocks' article on LP-gas safety requirements, compose the February "safety package." . . . Like safety, promoting gas sales is a personal responsibility. The Oklahoma Natural Gas Company shows this month how every member of the organization, from executive to office worker, is brought into the commercial gas sales effort. Gas men in general should take note, particularly at this time when trained salesmen are in such short supply. . . . Selling is also the theme of the lead story which outlines a suggested "action program" to promote automatic gas water heating. . . . The highly successful Gas Has Got It campaign and the new water heating program should prove conclusively that coordinated effort by the entire gas industry will "move mountains."

JAMES M. BEALL
EDITOR

JAC A. CUSHMAN
MANAGING EDITOR

EDITORIAL OFFICES:
AMERICAN GAS ASSOCIATION
420 LEXINGTON AVE., NEW YORK 17, N.Y.

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Water heating "action program"

A PAR activity SIX fundamental appeals are suggested by a newly completed consumer survey as the corner-stone of a 1949 industry-wide program to promote automatic gas water heating. The survey was sponsored by the American Gas Association's General Promotional Planning Committee, Hugh H. Cuthrell, The Brooklyn Union Gas Co., chairman, with funds supplied by the PAR Committee, Robert A. Hornby, Pacific Lighting Corp., chairman. As a result, a detailed "program of action" has been suggested for the entire gas industry.

The most important facts which the gas industry will stress to influence consumer purchases are the following sales appeals, listed in the order of their importance:

(1) automatic features (2) dependability (3) economy (4) cleanliness (5) the superior fuel-gas, and (6) construction.

Concerted action by the gas industry is needed, the survey discloses, to improve the favorable position of gas service in an ever broadening, highly competitive market. A. G. A. advertising and sales promotion, as well as that of gas utility and manufacturer members, will be built around these six sales appeals. Results of this survey are expected to develop new means of safe-guarding the industry's large stake in water heating and to open new promotional vistas.

•

Selection of the Elmo Roper organization to conduct the water heating survey was made by the General Promotional Planning Committee in view of the valuable service this organization had rendered to the American Gas Association in the 1946 survey on ranges. The earlier study has proved invaluable as the basis for the highly successful "Gas Has Got It" automatic gas range campaign.

The current water heating survey was carefully designed to discover what water heating equipment people prefer, why they bought their present equipment, what they plan to buy next and why. Most important, the survey aimed at uncovering the most effective sales and advertising approach for use by the gas industry and each of its component parts.

Analysis of the opinion pattern showed that part of the job of influencing consumer opinions must be done by gas utilities, part by the water heater manufacturers either directly or indirectly through the Gas Appliance Manufacturers Association, and part by the American Gas Association which has the added responsibility of correlating its own coordinated advertising and promotion with that of all parts of the industry.

This type of highly coordinated planning, with all elements built around the same basic ideas and welded into a unified campaign, insures increased selling efficiency. At the same time it will help the Association, its utility and manufacturer members, to obtain the highest possible return from each advertising and promotional dollar spent.

Nine basic conclusions are presented in this aggressive program as guide posts to serve the industry:

(1) All advertising and promotion efforts should be directed toward making customers less willing to tolerate inadequate water heater service.

(2) All promotion and advertising efforts should aim at enlarging customer dependence on automatic hot water service for more and more uses.

(3) More selling must be directed to men, as they participate in 91.2 percent of family decisions to buy water heaters.

(4) Builders and plumbers play an important role in total sales of water heaters, and the gas industry should make a determined effort to mobilize them as its selling allies.

(5) Gas utilities must recognize the competition of old worn-out gas water heaters.

(6) More effort should be made by utilities to sell automatic water heaters to those who now use coal or oil, or have no water heating facilities.

(7) Salesmen—utility, manufacturer, and dealer—must be better educated in the superior advantages of gas water heaters and trained in the best methods of presenting these advantages to potential purchasers. There is no adequate substitute for well-trained aggressive salesmen.

(8) The gas industry needs the aggressive support of a well-organized group of water heater manufacturers, com-

◀ *Gas compressor headers and induced draft cooling tower as seen through the arch of a low pressure intake connection at Ventura Station, Southern Counties Gas Company. Photo by Mel Jones*

mitted individually and collectively to an all-out program to sell gas water heaters, as the best means of supplying adequate automatic water heater service.

(9) All promotion and advertising should reemphasize the features which consumers generally desire in water heating, and show gas superiority on these points: automatic features, dependability, economy, cleanliness, the superior fuel-gas, and construction.

These conclusions are used as the basis for allocating responsibilities to the American Gas Association, gas companies, the Gas Appliance Manufacturers Association, and gas water heater manufacturers.

Four fundamental responsibilities are assigned to the Association:

(1) A.G.A. should have full and continuing responsibility for setting the national pattern for the most effective advertising and promotion programs for all interested parties through its General Promotional Planning Commmittee. This committee is composed jointly of gas utility and manufacturer personnel and represents all industry promotional and advertising groups.

(2) A.G.A. should plan and conduct its own advertising and publicity programs so as to stimulate gas water heater manufacturers to devote more of their own promotion and advertising funds to a product story fully coordinated with this pattern.

(3) A.G.A. should devise gas sales and promotion programs and tie-in advertising services for use at the local level, and should stimulate gas utilities to use them and implement them in ways most appropriate for individual application.

(4) A.G.A. should encourage gas utilities to amplify their own sales and promotion efforts by stimulating local dealer groups to do a more effective job of selling gas water heaters, and should assist in training dealer salesmen toward that end.

Conclusions contained in the "program for action" indicate that member gas companies should:

(1) Assume directly or indirectly the responsibility for promoting and selling automatic hot water service throughout the territories they serve.

(2) Capitalize on A.G.A. national magazine advertising programs by running at the local level tie-in advertising that follows the same general pattern.

(3) Make full use of A.G.A. national promotional programs. Such programs will pay biggest dividends if used effectively and simultaneously.

(4) Make best possible use of materials and assistance offered by water heater manufacturers.

(5) Train their own salesmen to be most effective in presenting the story of automatic hot water service to prospects and should acquaint the employees with its advantages.

(6) Amplify their own sales potential by securing cooperation of local dealer outlets and assist in training dealer salesmen for most effective selling of automatic gas water heating service.

(7) Formulate an effective policy to get an increasing share of the new home market.

(8) Make a concerted drive to replace old, worn out, obsolete and non-automatic gas water heaters with new automatic gas water heaters of adequate capacity.

(9) Direct attention to replacing with gas the miscellaneous fuels now used for water heating.

The survey shows that the Gas Appliance Manufacturers Association should assume the following list of responsibilities:

(1) G.A.M.A. should do everything possible to weld its gas water heater division into a well-organized group committed to an all-out program to sell automatic gas water heaters.

(2) Encourage its water heater manufacturers to give specific emphasis in national magazine advertising to automatic gas water heaters, following the national pattern set by A.G.A.

(3) Urge water heater manufacturers to give effective support to promotions promulgated by A.G.A., and encourage them to increase the effectiveness of such programs by producing appropriate tie-in materials and the widest possible dealer participation.

(4) Encourage water heater manufacturers to prepare effective product training courses which will also feature the six points of gas superiority, following the pattern set by A.G.A.

(5) Give earnest consideration to devising and promoting a "symbol of quality" for automatic gas water heaters —this symbol to become an effective buyers' guide and overshadow in importance the magic of brand names now identified with many electric water heaters.

The "program for action" assigns to gas water heater manufacturers the following areas of responsibility:

(1) Gas water heater manufacturers should do a more adequate job of national magazine, regional, and local advertising to sell their own brand of automatic gas water heaters—such advertising to emphasize the six points of gas superiority *(Continued on page 39)*

Attention gas industry photographers!

● The MONTHLY announces its 1949 *frontispiece illustration contest* open to photographers who are members of the Association or who are employed by member companies.

● Prizes are ten dollars for each photograph selected for publication as a frontispiece illustration in the MONTHLY. Photographs will be selected principally for their pictorial excellence but *must* be related to the gas industry. Artistic expression of gas industry operations and the personal element are desired.

● Contestants preferably should submit glossy black and white prints not less than eight by ten inches, unmounted. Vertical rather than horizontal pictures are preferred. Please look at past frontispieces in the MONTHLY for general style before taking pictures.

● Each entry should be accompanied by a 25-word caption.

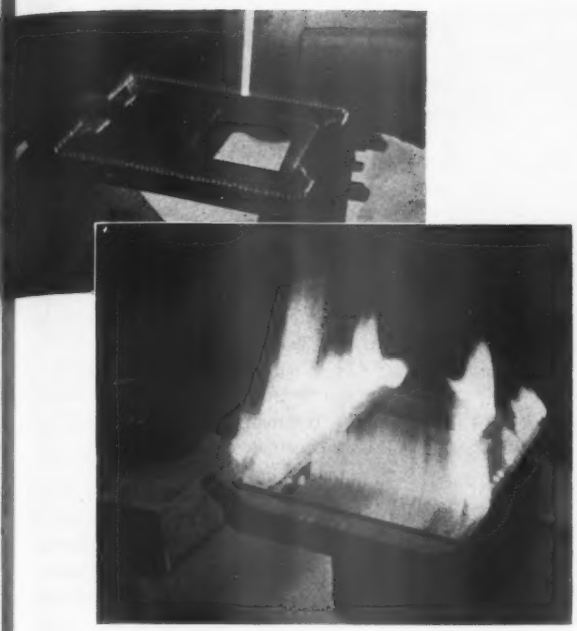
● Photographs which have appeared in other publications will not be accepted but no restriction will be placed on the use of entries following appearance in the MONTHLY.

● It is suggested that company camera clubs or other photographic groups consider the possibility of sponsoring local "print nights," with the winning prints being submitted as described above.

● Please send all photographs to: American Gas Association MONTHLY, 420 Lexington Ave., New York 17, N. Y. Be sure to exercise care in wrapping so that pictures will not be bent or otherwise marred.

Utility defines problems and develops a long-range program

Story of gas change-over



Operation of oven burners on propane-air before (lower left) and after (upper left) they were properly drilled and adjusted.

By RALPH GIBSON

Gas Superintendent
Tide Water Power Co.,
Wilmington, N. C.

Many gas companies today are enjoying, or as the case may be, suffering from, an unparallelled demand for gas service. This demand develops a problem of capacity to serve.

The answer to the problem not only should satisfy a long-range program satisfactorily to add new loads, but it must be profitable, a fact that is true of small as well as large companies.

In reviewing the projected plans of many companies in the industry to solve the capacity problem economically, we find the trend clearly defined in favoring a higher B.t.u. gas as a replacement for a lower B.t.u. gas. The trend appears to be so general that the feeling of many operators is that the substitution will be permanent and perhaps in the future low B.t.u. operations as a finished gas will have passed out of the picture.

Some companies are finding the solution in natural gas, others have gone to high B.t.u. oil gas, some to the catalytic cracking processes, and still others to the varied applications of the LP-gases.

Our company, after having studied the economics of a change-over, has substituted propane-air in three small properties replacing carburetted water gas. As a result of this experience we have developed a factual story, defining the problems involved as:

1. Customer appliances
2. Mains, services, meters, regulators
3. Measurement
4. New plant.

Customer Appliances

In these change-overs, a manufactured gas of 540 B.t.u. specific gravity .68, was replaced with propane-air of 864 B.t.u. specific gravity 1.17. The replacement was made in one step.

The new gas is roughly 60 percent higher in B.t.u. and 70 percent heavier than the old gas. Experience has proven that most gas-burning appliances will not accommodate an interchange of gases of these characteristics, safely or satisfactorily, without specific adaptations.

Most oven burners designed for operation on the old gas will not assure complete flame travel or rapid ignition on the new gas for the reason that the ports are too far apart. Also many oven burners do not have ports on the corners and ends as in the case of the U-shaped burner, thus preventing the flame from crossing over from inside to outside or vice-versa. Burners with raised ports will not assure flame travel with the new gas.

Even though burners do have sufficient port area to accommodate the higher B.t.u. gas, the spacing of the ports must be close enough, not more than $\frac{3}{8}$-inch apart, to assure quick ignition and complete flame travel.

Most oven burners which are lighted through a lighter tube do not have enough lighter ports to assure ignition.

Then there are, of course, many burners having ports closed off from grease or rust which prevent proper flame travel. It is not difficult to find burners which are actually broken in sections and still being used, which of course is not safe.

It is found that new ports drilled close to the venturi throat must be smaller than those farther away, otherwise a long yellow flame will develop close to the venturi which cannot be removed without under-gassing the burner.

In order to obtain the proper B.t.u. input on each burner it is necessary to take a pressure at the appliance, size a new orifice to the pressure, the new B.t.u. of the gas and the specific gravity. We find that replacing the orifice is the most satisfactory way of obtaining proper B.t.u. input.

Refrigerator burners should be replaced with burners especially provided with a larger air barrel and also the orifice should be replaced with an orifice drilled to proper B.t.u. input on each particular size refrigerator.

Many steam table burners and coffee

Presented at annual meeting of the Mid-Southeastern Gas Association in Raleigh, N. C., November 11 and 12.

urn burners should be replaced particularly if the burner is too far away from or too close to the utensil to be heated. It should be noted that a flame with the new gas, burns when properly adjusted, with a lazy appearance and is usually shorter than the old gas. It is therefore important to compensate for the change in distance between the burner and utensil in order to maintain efficiency.

This fact is also found to be true with side-arm water heaters where the burner is not close enough to the coils to maintain efficiency. Again this fact is found in the case of the old star top burner as against the newer and more recent top burners which are located closer to the utensil. The relative position of burners to utensils becomes quite important when rates are based upon B.t.u. of the old gas and increased according to the B.t.u. of the new gas. Quite naturally if the same burner efficiency is not maintained then the customer's bills will be increased.

Automatic appliances should have 100 percent safety cut-offs. We have used the BASO valve very successfully and find that it lends itself very well to many appliances not having full safeties.

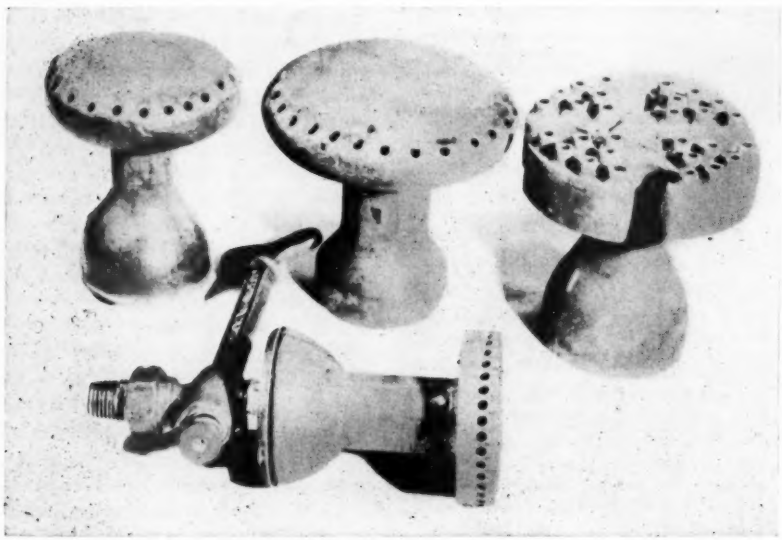
Our plans for changing a gas system over from a low to high B.t.u. gas in one step call for two conversions, the first, which we call the preliminary conversion, operates entirely on the old gas and involves:

(1) A complete and detailed survey and an inspection of every gas-burning appliance on the system.

(2) Installation of 100 percent safety controls on all automatic appliances not so equipped.

(3) The removal of every oven burner in use, brought to a central work shop, properly drilled under supervision, tested on the new gas and returned to the customer's appliance within 24 hours.

(4) Orifices on automatic equipment, mainly water heaters, replaced with the proper-sized orifice for the new gas.



Preliminary conversion during changeover from a low to a high B.t.u. gas includes the replacement of these burners for gas coffee urns, steam tables and similar equipment, with suitable new burners

(5) All rusted air shutters, broken pilots, broken burners, etc. are repaired.

(6) All coffee urn and steam table burners are replaced with new ones.

(7) Refrigerator burners are replaced with properly designed new ones but not until a few days before the new gas is introduced. This will save a flue cleaning job.

(8) Special dental torches, linotype machine burners, neon tube burners etc. are installed in place of the old ones.

(9) Special bunsen burners for high school laboratories, dental laboratories etc. are installed in place of the old ones.

When preliminary conversion is completed, the final phase is ready, that of purging the system of the old gas and putting the new gas on the town.

This phase involves merely gas and air adjustments and is accomplished safely in rapid order.

Each service crew is assigned a certain section of the city on the preliminary conversion and is responsible for the same section when the new gas goes in. This procedure accomplishes three objectives:

(1) Familiarizes each man with his territory and the appliances in it.

(2) Places definite responsibility on the job to be done.

(3) Assures no skip-overs on the preliminary conversion.

When the new gas is turned in all crews are assigned to establishments of public interest and safety and then dispatched to their respective territories.

Newspaper advertising and radio announcements precede the actual conversion with such instructions as:

(1) Do not use your oven until our service man has called.

(2) Do not light automatic appliances—call the company for this service.

(3) The new gas possesses a definite pungent odor. Please report leaks immediately.

(4) Because of the characteristics of the new gas, keep the flames on the top burners of your range lower than usual until our service man has called.

(5) Watch the daily papers for an announcement as to when service men will be in your area—be sure some one is home to admit service man.

Our experience has been that when the conversion is completed in the above manner, very few appliances need further attention—from the appliance angle, the conversion is over.

The effect which propane-air has on the distribution system is of course relative. It definitely is known that LP-gas with its solvent action and affinity for certain substances will develop some conditions which did not exist before the change-over. Very likely, a drying out of the system will take place. Water will move where it had not been found previously, iron rust will develop and move into services. Napthalene will be picked up and carried to the remotest corners of the distribution system. These conditions, we have found, usually develop immediately after the new gas goes into the system. *(Continued on page 45)*

Hot water in the laundry

By DR. PAULINE BEERY MACK

Director, Ellen H. Richards Institute
The Pennsylvania State College
State College, Pa.

Water constitutes the most important individual reagent employed in the laundry process, and the condition of the water determines to a very considerable extent the efficiency of soil and stain removal and the retention of the original appearance of a fabric during a washing process.

This report has two parts, as follows:

(1) The findings of a five-year study on water temperatures in relation to soil removal, stain removal, whiteness retention (of white fabrics), and strength preservation during the laundering of standard test assemblies, using five representative detergents in various concentrations and at various washing times. This part of the study was conducted by the use of a multiple laboratory washing device provided with 20 one-gallon test jars in which provision for maintaining a series of constant temperatures was made; and

(2) The results of practical laundry trials in commercial and household laundry equipment, including soil removal, whiteness retention, bacteriological findings, and general observations.

Presented at Residential Gas Section meeting during 1948 A.G.A. Convention in Atlantic City, New Jersey and based on an address on "A Study of Water Temperatures in the Laundry Process."

Part (1) of the investigation included 22,500 washings on 450 test assemblies, consisting of standard oily carbon black soil, standard white and standard breaking strength test fabrics. These required 3,600 sets of evaluations, each set involving four Reflectometer and 20 breaking strength readings. In addition, 360 separate washings on standard clay soiled fabrics, and 360 washings on standard stain swatch assemblies composed of 28 stained specimens, each with their attendant initial and final evaluations, brought the total number of separate sets of evaluations to 5,040.

The 28 stained swatches represented stains commonly found on household textiles and wearing apparel.

Practical results were based on trial runs in these laboratories using power laundry equipment and representative household automatic and manually operated machines, respectively, on power laundry procedures carried out in commercial and institutional laundries, and on household equipment used in homes or under home conditions.

Five detergents representing types commonly in use were used throughout. These were as follows: Detergent (A), a synthetic detergent of the sodium lauryl sulfate (Gardinol, Dreft) type; Detergent (B), a household neutral soap; Detergent (C), an alkaline built soap; Detergent (D), another type of built soap; and Detergent (E), a neutral soap designed for power laundry use.

The washing bath is a complicated system in which many factors are associated to give good or poor detergency

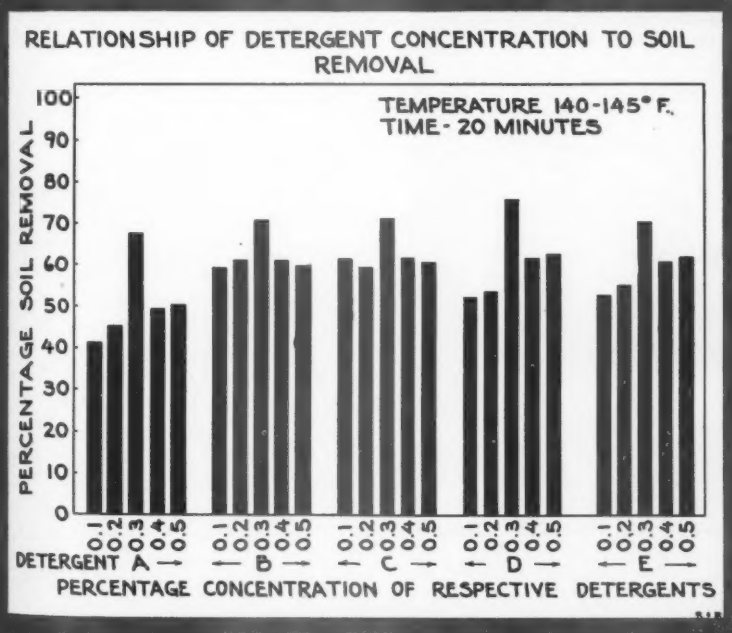
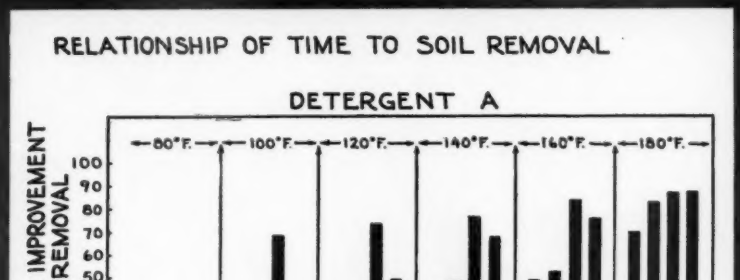
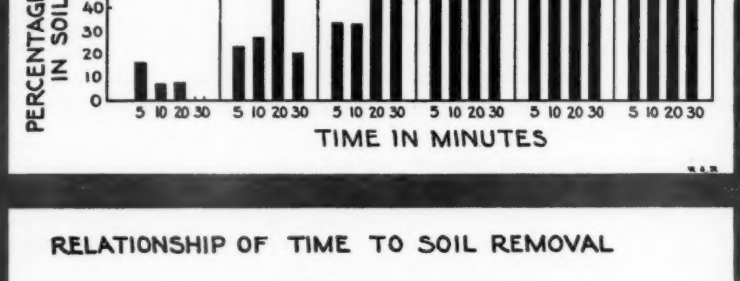
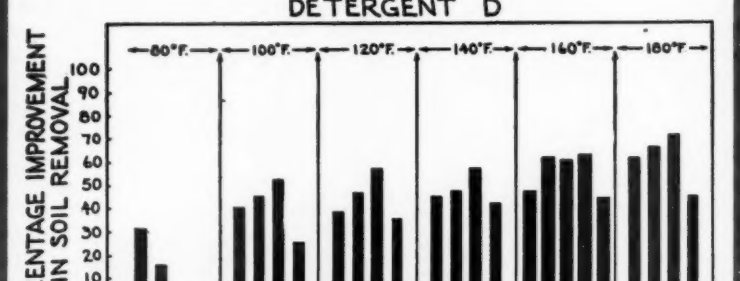


Figure 1. Percentage of oily carbon black soil removed by different detergent concentrations







Top to bottom, Figures 2a, 2b, 3a. Oily carbon black soil and soft water of zero grain hardness

result. These involve many factors, including concentration of the detergent, time of one washing, and temperature of the bath. Hence these three factors—among others, such as hardness of the water and type of mechanical action—were studied.

Some of the results obtained from this long-term study are shown in a series of graphs which tell their own story. The trials shown in these graphs were made under controlled laboratory conditions with water of zero grain hardness.

Figure 1 shows the relationship of soap concentration to soil removal for all detergents, a concentration of the soap or other detergent of 0.3 percent gave superior detergency results in soft water. This was true for temperatures of 140°F and above, at an optimum washing time of 20 minutes. The results of this part of the study show that there is an optimum soap concentration beyond which additional amounts reduce the detergency efficiency markedly for soap and detergents of the sudsing type. This concentration is related to a firm suds approximately one and one-half to two inches high.

Washing times

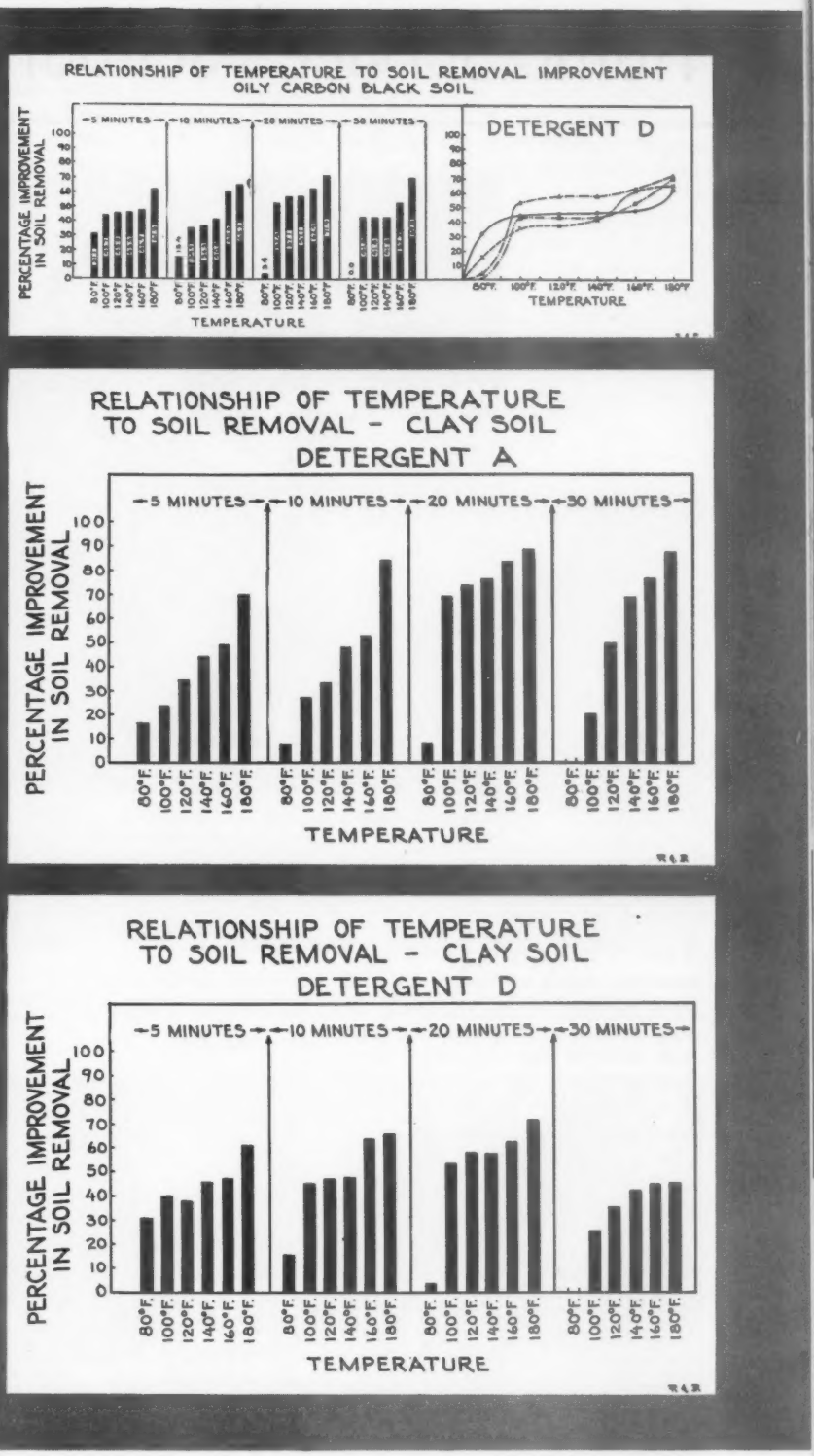
There is an optimum time for one washing bath, below and above which poorer soil removal results than those obtained at the optimum will result. Figures 2a and 2b show the findings, respectively, for a synthetic detergent of the sodium lauryl sulfate type (Detergent A), and of a typical built soap (Detergent D). In these figures, the poorest soil removal results obtained in each series (that found at 80°F for a 30-minute washing time) was used as the base figure, and the results at all other concentrations were calculated as percentage of soil removal improvement in relation to this basis.

Washing times of five, ten, 20, and 30 minutes were investigated in the Detergent A, and of five, ten, 15, 20, and 30 in the Detergent D series.

Figure 2a shows that, at 80°F, removal of oily soil at all concentrations was extremely poor, and that the values became poorer instead of better with increased times of washing. At all other temperatures, the maximum percentage of soil had been removed at 20 minutes. At all temperatures except 180°F, less soil was removed at 20 than at 30 minutes. Figure 2b shows the same trend with a built soap, except for the fact that, at 160°F, approximately equal improvements in soil removal were obtained at ten, 15, and 20 minutes. Moreover, a 30-minute washing time gave poor results throughout, even at 180°F.

The poorer results obtained at washing times beyond the optimum result from poor deflocculation at times in one detergent bath which are too long. Dirt

Top to bottom, Figures 3b, 3c, 3d. Soft water and optimum soap concentration of 0.3 percent



once removed must be held in suspension or it reprecipitates on the fabric. The standard white pieces used in the washing trials show very strikingly the poor results obtained from washing times which were extended beyond the optimum.

The belief that low temperatures will give good laundering results has been shown to be entirely fallacious in these studies. Figure 3a gives the comparative results in terms of improvement in soil removal efficiency by a synthetic detergent of the type exemplified by Detergent A (using 80°F for a 30-minute washing time as a basis of comparison) for oily carbon black soil, for temperatures of 80°F, 100°F, 120°F, 140°F, 160°F, and 180°F, for four washing times, namely—five, ten, 20, and 30 minutes. This figure shows that, for each of the times included in this part of the investigation, soil removal efficiency improved consistently with increases in temperature.

The differences in results at the different temperatures were less marked at the optimum washing time (20 minutes) than at shorter or longer washing times; but even here the differences were sufficiently great to be discernible by the naked eye as well as by delicate light-reflectancy electronic measuring equipment. Figure 3b shows the same general results for oily carbon black standard soiled fabrics with Detergent (D), a built soap.

Figure 3c shows the temperature series of Detergent A (a built soap) with clay soil at six different washing temperatures and four washing times. The same general trends were shown as for oily soil, with 160°F and 180°F, outstandingly better than lower temperatures at the optimum times of ten and 20 minutes. Figure 3d shows the same trends with clay soil laundered with Detergent D.

In general, the temperature series for the detergents shown in Figures 3a, b, c, and d, as well as with the other three detergents for which graphs are not given in this abstract show that higher temperatures consistently give improved detergency where oily dark-colored soil is concerned, with 180°F giving the best and 160°F the next best in this respect.

The temperatures reported in this study were those *in the washing bath,* not at the tank or other sources of the hot water. Temperature losses occur in the line from the source to the washing device, and also from the point of entry in the washer to the actual wetting of the fabrics. *(Continued on page 42)*

Home service "school of the air"

Nashville home service broadcast from New Freedom Gas Kitchen on gas company's sales floor: (left to right) Billie Hunley, student; Lucy Dye, home economics supervisor; Mrs. Franklin Hammer, teacher; Carolyn Davis, and James Kent, announcer

By CAROLYN DAVIS

Home Service Director
Nashville Gas & Heating Co.
Nashville, Tenn.

In the spring of 1947 a survey showed that in the home economics departments of schools on our gas mains the great majority of gas equipment was very obsolete, in many cases the ranges were 18 to 20 years old and completely inadequate to meet the needs of students. Following a conference with the home economics supervisor of the city schools we decided to put in on a consignment basis sufficient gas equipment to meet the needs of every individual home economics department in the schools served by our gas mains.

In order to introduce our replacement plan to teachers in the city school system, we were asked by the supervisor of home economics to demonstrate the appliances at a teacher workshop meeting. This provided an opportunity to tell teachers and educational workers what we had to offer them as a public utility.

A bulletin sign entitled "Blue Flame Magic for Junior Homemakers" helped us to put over the theme of our demonstration, while a commercial artist made cut-out figures of an old black range and a modern up-to-date gas range. Five "Miss Flames" were arranged on the bulletin board to emphasize the modernity and convenience of the new equipment. This bulletin board also served as the background for the gas equipment to be demonstrated, and posters of New Freedom Gas Kitchens and modern cookery methods were arranged in other parts of the room.

As a tie-in with the school range replacement program, we worked out with the supervisor and teachers a 15-minute radio program entitled "Home Ec. Highlights" which was sponsored by the gas company and broadcast each Saturday morning direct from the New Freedom Gas Kitchen on our sales floor.

This same general procedure was followed on each weekly program and the regular gas company jingle used on all radio programs was employed as the theme song. Each week a different home economics teacher and one of her outstanding students appeared on the radio series to discuss class projects and how they are related to everyday living. As hostess, the home service director of the gas company introduced the various guests and brought out points helpful to homemakers.

A bulletin prepared by the home service department entitled "Home Ec. Highlights" contained material that the teachers had submitted for the script for each program and was mailed afterwards to all listeners who requested it. In addition, a mailing list was prepared of all home economics teachers and people in the educational field who might be interested in receiving the weekly bulletin. Teachers who appeared on the program were sent sufficient copies to give

out to their classes as a final summary of their project. As a novel token of appreciation from the gas company each guest participating on the programs received a gold compact with a "Blue Flame" emblem and the guest's intials.

Discussion topics for each week were selected well in advance by individual teachers from the regular curriculum in order to make the topic an actual part of the girls' home economics training. The home service director, cooperating with the teachers and students elected, then worked out script material from the actual classroom projects. As the next step the final script was prepared by the gas company's advertising agency and carefully worded to eliminate direct sales promotion.

The initial program in our radio series was dedicated to the retired home economics supervisor who had first pioneered in Nashville in 1901. Miss Lucy Dye, the present home economics supervisor, gave a brief sketch of the history of home economics in Nashville. Then came a discussion of the first topic, "Economy in Meal Planning."

Space does not permit me to describe each subject covered, but I would like to discuss a few of those mentioned to show just how they were worked into the curriculum. For example, in connection with the broadcast "Foreign Cookery", which has been one of the most successful, the customs, food habits and favorite dishes of each country were covered in a classroom study. The class then planned a menu consolidating the dishes into a United Nations Luncheon which was served to a guest list of 12 persons including representatives of the board of education, faculty members and the home service director of the gas company. Invitations bearing the luncheon menu were prepared by the art department of the school cooperating with the home economics teacher.

As a climax to the school term's work, the last two broadcasts brought out the definite advantages which a girl gets from home economics in high school and college. The subjects "What Home Ec. Can Mean to a Girl" and "Careers in Home Economics," were planned so as to lead up to the next series of radio programs on the "Career Records" from the American Gas Association. This record series was broadcast each week for eight weeks and proved to be an excellent follow-up for the last two school broadcasts. Since that time the "Career Records" have been played in the classrooms upon request from the home economics teachers.

Teacher reaction to the gas company programs is illustrated by the following statement by Miss Lucy Dye, the present home economics supervisor of the Nashville City schools:

"The series of broadcasts proved to be a worthwhile and profitable experience, as evidencd by the fact that at the Home Economics Trading Post, where each teacher shared her outstanding home economics project with the group, invariably the opening sentence was, 'My best project was the one we broadcast, —'

"A brief review of individual projects revealed that as much as six weeks' work was involved in planning and executing the ideas. The broadcast itself gave added impetus to the culminating activity, and served as a means of bringing the home economics departments closer together. 'Going on the air' was the basis of much valuable correlations with other subject fields, particularly English, Speech and Science. The project was also a splendid contribution to public relations and served as a means of cementing the efforts of the home, school, community and industry. We were glad to have had a part in this worthwhile endeavor."

Carolyn Davis (left), home service director, and Mildred Ann Smith, home service representative, demonstrating features of modern gas equipment during teacher workshop meeting designed to introduce the local gas company's equipment replacement plan to teachers in the city school system

This "New England luncheon" in Nashville high school gave students a valuable tie in with gas company radio broadcast on New England cookery. Home service broadcast on foreign cookery was accompanied by "United Nations luncheon," classroom study of foreign customs, food habits and favorite dishes

PAR plan gaining national recognition

By SY RADZWILLER

Reprinted from Retailing Daily
New York, N. Y.

It was no accident that the gas industry laid 8 million dollars on the barrelhead to advertise and promote automatic gas ranges last year—and it should surprise nobody the expense paid off.

When the American Gas Association's advertising expenditure on ranges was upped 50 percent, the national advertising of "CP" range manufacturers was tripled and local advertising of gas companies and dealers was doubled. Although the total sale of gas ranges rose 25 percent, the sale of automatic gas ranges was tripled.

How this was done is more than a story of mere sales and advertising. It was a seldom achieved example of integration and coordination by all segments of an industry working hand in glove with a trade association. For the record, most of it is contained in the fourth annual report of the Promotion, Advertising and Research (PAR) Plan of the A.G.A.

In a press conference, Robert A. Hornby, chairman of the A.G.A.'s committee on promotion, advertising and research, and vice-president of Pacific Lighting Corp., announced that the investment by contributing members of the gas industry of six million dollars in the PAR program during the last four years is already being rapidly repaid.

Moreover, he stated, "although basic research sometimes requires as much as 15 years to reach profitable fruition, according to Dr. Charles F. Kettering, former director of research for General Motors Corp., projects undertaken by the Gas Production Research and General Technical Research Committees under the PAR program after less than four years of actual research have achieved results that will bring, in the immediate future, dollar returns that are several times in excess of the money invested in these activities."

The promotional and advertising programs carried on under the PAR plan have brought about coordination on the part of A.G.A., the gas utility companies and the gas appliance manufacturers and dealers. This, said Mr. Hornby, has been in no small part responsible for the gain of nearly 15 percent last year in the sale of gas and has lifted sales of domestic gas ranges, gas refrigerators and other appliances to new high levels.

In outlining the association's PAR plan, he emphasized that this work was entirely financed at the rate of about $1,600,000 a year by voluntary contributions from member companies. His committee is charged with determining the needs of the industry in fields of promotion, advertising and research, and with raising the funds to fulfill these needs. It then directs the expenditure of the funds under the supervision of the A.G.A.'s executive board and finance committee.

Last year, $800,000 worth of PAR funds was allocated to national advertising, out of which $660,000 was spent to advertise gas appliances and residential gas service. There had been ample evidence that the public was not aware of the availability and advantages of "CP" ranges and since this job could not be done solely by this part of the PAR program, the committee's aim was to stimulate greater advertising by range manufacturers, *(Continued on page 45)*

PAR noted for "exciting" performance

THE AMERICAN GAS ASSOCIATION'S "PAR PLAN" is an outstanding and, I think, rather exciting example of what can be accomplished when the members of a group exert their efforts and money on major, industrywide objectives instead of—as is so often evident—upon minor conferences and petty politics.

Its not every association that can report expenditures for 1948 as does A.G.A., of amounts like $800,000 for advertising and $200,000 for sales promotion of the gas industry and its appliances. The result, among other accomplishments, is sales of all gas ranges increased about 25 percent to a new record, while "sales of automatic 'CP' (Certified Performance) gas ranges were increased more than 300 percent during the year." But neither can every association report such enthusiastic cooperation and support of its members to their industry program, regardless of the amount involved.—*Earl Lifshey* in Retailing Daily.

Analysis of gas flow in and arouna flames required in developing fundamental information

Tubular combustion chambers

By RICHARD L. STONE

Research Engineer
American Gas Association
Testing Laboratories

A PAR activity

Heat, as produced by a gas flame, is taken for granted in so many ways that the technical aspects of the heat transfer phenomena from simple gas flames provide a fertile field of exploration that is just beginning to be scratched. To provide more specific data helpful in the design of central heating furnaces, studies are now being conducted by the American Gas Association Testing Laboratories to explore the important heat transfer factors involved. This project, entitled "Research in Fundamentals of Heat Transfer in Central Gas Space Heating Furnaces" (DGR-1-CH), is a PAR activity sponsored by the Committee on Domestic Gas Research, R. J. Rutherford, Worcester Gas Light Co., Worcester, Mass., chairman.

Apparatus employed for the investigation consists of a small vertical heat exchanger containing a tubular stainless steel combustion chamber four inches in diameter by four feet high. This tube is surrounded with an annular space two inches wide through which cooling air is blown upward at about 900 feet per minute. This equipment is completely instrumented to measure all important temperature gradients and flow rates of the gases supplied. A variety of single port and multiport burners are being tested in this exchanger at various gas rates, and over a wide range of primary and secondary aeration. All combustion and cooling air is supplied by blowers and carefully regulated by valves.

A similar apparatus also has been constructed using an uncooled Pyrex glass tube of about the same size as the stainless steel tube. This glass tube permits observation as well as photographing of flames under conditions geometrically similar to those in the steel heat exchanger.

At an early stage of the investigation it was observed that behavior of the exchanger was quite different from that of typical parallel flow heat exchangers. It appeared that an exchanger containing a flame could not be treated as if it contained a hot fluid which cooled continuously from inlet to outlet. Obviously maximum hot fluid temperatures are not produced until combustion is completed or at least well under way.

Analyses of numerous test runs and a sketch are illustrated in Figure 1 which diagrams a typical condition in the exchanger when equipped with a single port burner. The diagram illustrates the general configuration of this combustion system with its flame and flue gas currents, and also shows a graph of heating element wall temperatures. Surrounding the flame, the small arrows show observed directions of gas flow.

The flame shown in Figure 1 is adjusted with 50 percent primary air. At this aeration rate the inner cone is partly formed but its upper end is not closed over and merges with the outer mantle. Unlike a typical Bunsen flame in the open air, the tip of the outer mantle disintegrates. This is due to turbulence created by the combustion process.

It will be noted in Figure 1 that secondary air is supplied at the bottom of the chamber and flows vertically until it approaches the flame. There it is drawn toward and into the flame by a natural

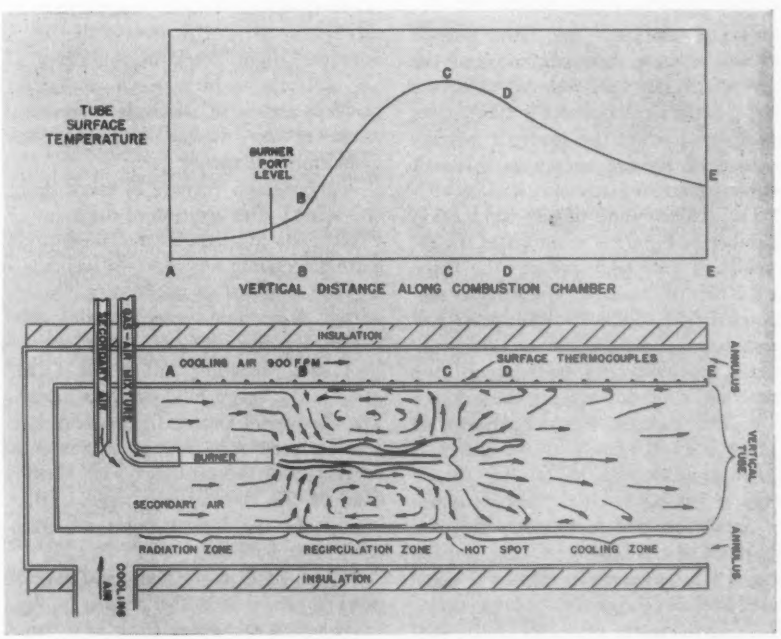


Figure 1. Surface temperatures and flow patterns in vertical tube combustion chamber

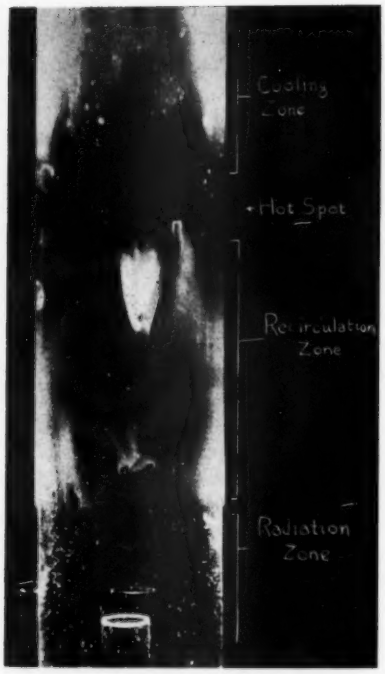


Figure 2. Condensate formed one second after the ignition of a 50 percent primary air flame

inspirating action.

This lowest zone of the combustion chamber, which contains only the burner, flame and secondary air, is indicated as the radiation zone. In this section of the heat exchanger, heat is transferred to the heating element walls primarily by radiation from the flame itself. The secondary air alongside this lower portion of wall actually reabsorbs some of the heat which the wall received from the flame. Since air is essentially transparent to radiation from the flame, it permits passage of radiant energy to the wall without absorbing any heat itself.

The middle zone of the combustion chamber in Figure 1 is shown as the recirculation zone and contains the flame at the axis of the tube. The flame is surrounded by a mixture of flue gases and secondary air in rapid motion which circulates up along the boundary of the flame and then down along the element wall. The cause of this recirculation, or vortex, is a combination of the effects of initial vertical velocity of the gas-air mixture issuing from the burner ports, its expansion due to heating, and the buoyancy of the heated mixture. An excess of kinetic energy in this jet is dissipated by fluid friction losses in the vortex.

Along the lower boundary of the vortex there is an interface between it and incoming secondary air. This further aids in supplying combustion air to the flame. The secondary air is pulled along this boundary by the motion of recirculation and forced into the flame where it becomes available to complete the combustion process.

It was found that the flame burns at practically constant diameter (except for smallstanding waves) until it reaches the end of the vortex where it seems suddenly to disintegrate. At this point combustion does not cease but the end of the flame becomes unstable and rather "floppy," often apparently brushing the wall of the tube. Here maximum turbulence in the combustion chamber is found, together with a flow of the hottest gases directly at the walls. Thus the location of the maximum temperature point on the element wall is fixed by the combined effects of maximum temperature and maximum scrubbing.

Above this "hot spot" the cooling zone of the heat exchanger behaves in a normal manner even though residual flames may be found in this upper zone. Although there is a slight distance lag between the hot spot at point "C" in Figure 1 and the beginning of true cooling at "D," the system functions as a normal parallel flow fluid-to-fluid heat exchanger from point "C" to wherever its outlet may be.

The wall temperature curve shown to the left of the exchanger diagram is fairly typical of single port burners in this system. It is of particular interest to note the slight break in the curve at "B" where a sudden rise in wall temperature occurs as relatively cool rising secondary air meets descending hot gases from the vortex.

A photograph (Figure 2) taken about one second after ignition of the flame in a cold glass tube, shows the presence of these descending hot gases, or recirculating flue products as condensate. On ignition, water condenses on the tube walls immediately, evaporates at the "hot spot" position and finally disappears as the entire tube becomes heated. The "hot spot" location is the clear dark area between two sections of the tube covered with condensate. The bottom edge of the recirculation zone is thus located by the lowest point at which condensate is found.

Recirculation of the flame and the hot gases it produces is also shown in Figure 3 which is a photograph of a flame colored with titanium tetrachloride

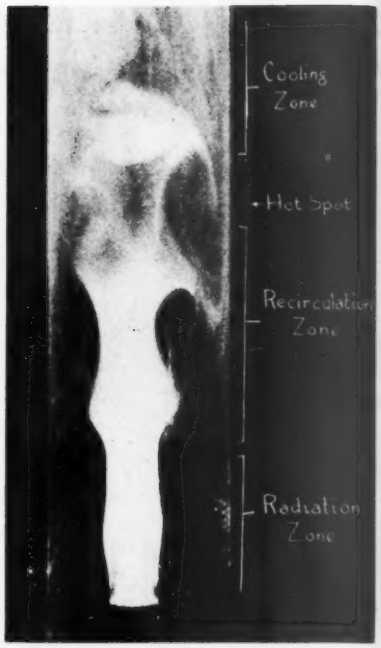


Figure 3. Close-up of flame with 50 percent primary air, smoke added to air-gas mixture

smoke and spotlighted from above. The disintegration of the flame to create a hot spot, the tendency to start recirculation, and the lower boundary of the vortex all are clearly shown.

Figure 3 depicts a case of combustion with low excess air (about 50 percent primary and 70 percent secondary air to give 20 percent excess air). With high excess air, the vortex is blown out the tube before it becomes stabilized. However, increased excess air does not change the hot spot location appreciably, even though *(Continued on next page)*

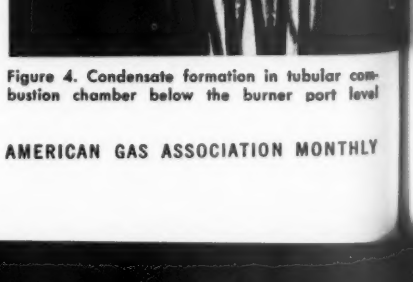


Figure 4. Condensate formation in tubular combustion chamber below the burner port level

the vortex disappears.

Observation disclosed the important fact that the "hot spot" location does not necessarily fall near the end of the flame. At low heat inputs, it may be found several inches beyond the end of the flame, while at high heat inputs combustion can continue well past the hot spot position. Another interesting point is that the existence of the vortex is not solely dependent on presence of the flame. A simple air jet flowing from the burner into the tube will create a vortex, although the vortex shape and position may be different.

Considering the over-all aspects of a system involving a flame with recirculating flue gases, it is apparent that the combustion chamber in the vicinity of the flame is divided into definite zones and that each zone should be treated as the location of a unique process. This applies to fluid flow conditions and equally to resulting heat transfer processes.

The relatively simple systematic heat balance analysis which can be applied to the cooling zone is, for obvious reasons, not applicable to the recirculation zone, where heat is being evolved by combustion, transferred by radiation and convection, and the entire fluid is involved in violent reverse flow. These simultaneous processes also make measurement and interpretation of combustion chamber temperatures most difficult.

In the system illustrated in Figures 1 through 3, the recirculation assisted the combustion process by supplying air to the flame. Recirculation is not always a boon to combustion and may easily result in incomplete combustion if proper precautions are not taken.

Such a situation is illustrated in Figure 4 which shows a burner with 24 tubular ports arranged in two concentric circles. This burner was operating at an input of 4,000 B.t.u. per hour in the glass tube. It can be seen that condensate is present below port level. This indicates that flue products are recirculating into the flame in such a way as to prevent adequate secondary air from reaching the burner ports in the outer circle. Floating of the flames together with formation of appreciable quantities of carbon monoxide was observed. To alleviate this condition, the lower boundary of recirculation can be raised above port level to assure complete combustion by the simple expedient of increasing secondary air.

Recirculation *(Continued on page 38)*

Industrial relations round-table

Prepared by A. G. A. Personnel Committee

● **Difficulties arising from the Supreme Court's** recent "Overtime on Overtime" decision, will be largely diminished if an amendment to the Wage-Hour Act tentatively proposed by the Labor Department is enacted. This tentative proposal provides:

(1) A premium paid for work on Saturdays, Sundays or holidays or on the sixth or seventh consecutive days of the workweek would be excluded from regular rate computation and credited toward overtime pay due under the act, if the premium paid is not less than one and one-half times the rate for like work performed in non-overtime hours on other days.

(2) A premium paid in compliance with a labor agreement for work outside the hours for work established by the agreement as the normal work day (not exceeding eight hours) would also be excluded from the computations provided again that the premium rate was not less than one and one-half times the ordinary rate.

● **Careers** in the electric light and power industry are portrayed in an attractive booklet prepared for distribution among college students by the Edison Electric Institute. The title is "Take A Look At The Outlook," and it describes the several phases of the industry in which young men may start their careers. In a series of charts it traces the growth of the industry, and the text tells something of the history, the present state of the business, and the future prospects.

● **State laws prohibiting the closed shop** have been upheld by the Supreme Court. The laws specifically upheld are those of Nebraska, North Carolina, Arizona and Tennessee. The Court was unanimous in upholding the right of the states to legislate against practices which may be found to be injurious in their internal, commercial, and business affairs so long as their laws do not run afoul of some specific Federal constitutional prohibition or of some valid Federal law. However, the effect of this decision depends on the Taft-Hartley Act provision forbidding Federal over-riding of such laws.

● **The Taft-Hartley Act** provision which states that employers need not bargain with foremen's unions, has been upheld by the Supreme Court in its refusal to review a challenge to the constitutionality of the law in the Edward G. Budd Manufacturing Company case. This decision may be affected also by the proposed abolition of the Taft-Hartley Act.

● **Chamber of Commerce publication** makes the remark "One might epitomize the task of an industrial relations man as always being on the alert against a kick in the plants." We hope its not quite as bad as that, at least in the gas industry.

● **A "Handbook of Labor Statistics"** has been published by the Bureau of Labor Statistics, and may be obtained for 75 cents from the Superintendent of Documents, Washington 25, D. C. It is entirely factual in nature covering among other things, wages in various lines, weekly earnings and productivity.

● **"Salaries of Personnel and Industrial Relations Executives: A Survey,"** is the title of an article appearing in the November 1948 issue of the Management Review published by the American Management Association. This article not only shows the results of the survey, but also presents an appendix containing job specifications of the positions surveyed.

● **Wages and fringe benefits** in the nation's key firms are the subjects of a series of reports being made by the Bureau of Labor Statistics. In the December issue of the *Monthly Labor Review,* the first report of the series which covers changes at American Woolen Company from 1939 to 1948, is presented. The succeeding companies to be studied will include the so-called pace-setters whose actions often provide patterns for change by other companies.

● **Holiday practices** have been studied by the National Industrial Conference Board and the results published in its report entitled "Studies in Personnel Policy No. 99."

● **Another N.I.C.B. item** of considerable interest is an article "Labor Press in the United States," appearing in the December 1948 issue of its Management Records. This article lists the publications and gives a resume of their uses to management.

● **"Suggestion Plans for Employees,"** published by the Policyholders Service Bureau of the Metropolitan Life Insurance Company, 1 Madison Avenue, New York 10, N. Y., will

(Continued on page 38)

- **Veteran heads** in the accident prevention field (above) found a short "breather" welcome during recent meeting in the board room at A. G. A. Headquarters in New York. A heavy agenda was completed during the two-day session.
- **McCarter Award Certificates** are discussed (below) by Subcommittee Chairman W. S. Alexander and W. T. Rogers. The McCarter Medal for successful resuscitation has been in existence for 25 years. In view of their yeoman service, the committee favors continuing both the award and the certificate.
- **Full attention** to the discussion (bottom right) is given by Chairman Brown, as a secretary jots down a running account of the meeting.
- **Accident statistics** receive a thorough going-over (picture at top right) from Subcommittee Chairman D. C. Stewart; Dr. W. J. Huff, representing the Technical Section's Chemical Committee, and R. S. Huffman, new member of the Accident Prevention Committee from Oklahoma.
- **Safety booklets** are discussed (bottom right) by Chairman P. L. G. Hasskarl and Subcommittee Member W. H. Adams. Proposed safety rules and comments on transmission and distribution of manufactured gas were given further attention.
- **Foreman's reminders,** and progress on safe practice cards which the committee sent out to all gas company delegates beginning last year, also were on the agenda.

Visits a committee meeting

Accident prevention group aims at greater achievements in 1949

An event of far-reaching importance marked the first meeting this year of the hard-working Accident Prevention Committee—one of the Association's top committees. Directed by Chairman W. F. Brown, the group is striving for a 25 percent reduction in the frequency and severity rates of gas industry accidents in 1949.

A. G. A. President Robert W. Hendee fired the opening shot in this crusade on January 17 in a personal letter addressed to the president of each member company. He appealed for a coordinated effort to halt the rising curve in industrial accidents. Early returns from half a dozen companies have promised full support in the drive.

Before closing the meeting, Chairman Brown suggested that the work of preparing "preventive medicine" would be simplified enormously if full details of recent accidents throughout the industry were made available for committee study.

- **Excellent cooperation** has been received from technical and operating committees of the industry. Discussing mutual problems in the picture at top of this page are James R. Bivens, representing A. G. A. Personnel Committee; B. I. Johnson, Safety Reminder chairman; George Ruoff, past-chairman, Accident Prevention Committee, and P. G. Facey, chairman, Gas Production Safety Subcommittee.
- **Safety films group** headed by Howard T. Jayne (second from left in center picture above), reviewed progress on film covering 200 accidents in the gas industry. Studying report with Mr. Jayne are A. L. Dowden who is preparing the film, George McDonald, National Safety Council, and A. S. Hancock.
- **Recommendations on oxygen** rather than oxygen and CO_2 for resuscitation were described by Dr. Cecil K. Drinker (shown at right in picture directly above). "I certainly would never recommend dropping the use of O_2 CO_2 material for carbon monoxide asphyxia," he said. Listening intently are E. C. Baumann, chairman, Poster Subcommittee, and A. V. Brashear, representing A. G. A. Distribution Committee.

Research at work

Domestic gas conferences

A PAR activity Engineers and others concerned with all phases of gas usage in the home, and in development and improvement of domestic gas appliances, will gather in Cleveland, Ohio, Thursday and Friday, March 31 and April 1, for the American Gas Association Conference on Domestic Research and utilization.

This conference, sponsored jointly by the Committee on Domestic Gas Research, R. J. Rutherford, chairman, and the several utilization committees of the Association, will be attended by gas company engineers, installation and service men, and design engineers and field engineers of appliance manufacturing companies in the East, Midwest and South. A parallel conference, sponsored jointly by A. G. A. and the Pacific Coast Gas Association, will be held in Los Angeles, Calif., May 26 and 27.

R. J. Rutherford

Changing conditions in residential building construction, such as the erection of smaller, tighter houses, many of them without basements, and the demand for higher performance and greater automatic operation of all gas appliances, have presented many new technical problems to all who deal with appliances, their design, construction, installation and maintenance. The latest technical and operating data and practices will be presented and analyzed by leading engineers in their fields at these two conferences.

Explanatory data on recently completed and currently active research will bring this subject up to date. New ideas and successful practices in installation, maintenance and servicing, will have a prominent place on the program.

A feature of the Cleveland conference will be research and utilization clinics. These valuable sessions will get down to the grass roots problems concerned with igniting and burning gas, properly applying and controlling heat, and venting the products of combustion. Due to the rapidly increasing number of appliances with automatic controls, the important subjects of design, installation and servicing of controls will receive considerable attention.

The recent thorough overhauling of A. G. A. Approval Requirements will be an important subject on the conference program. The significance of changes made in approval requirements for different groups of appliances will be given full attention. Members of the A. G. A. Testing Laboratories staff, and representatives from other institutions engaged in gas utilization will take part in various phases of the program.

This conference on domestic research and utilization will be held at the Hotel Statler in Cleveland. Reservations should be made promptly, direct with the hotel.

Central space heating group meets

Analysis and approval for publication this spring of a technical report on aeration of central gas heating appliances (when located in closets and other small spaces) was one of the important actions taken by the Association's Technical Advisory Group for Central Gas Space Heating Research at its January meeting in New York. William M. Myler, Jr., Surface Combustion Corp., Toledo, Ohio, is chairman of the group.

This project, which is being conducted at the A. G. A. Testing Laboratories, is of particular importance now due to the tendency of some architects to provide only limited, confined spaces for heating plants and water heaters.

This A. G. A. technical advisory group is supervising the following domestic gas research projects: DGR-1-CH, "Research in Fundamentals of Heat Transfer in Central Gas Space Heating Furnaces," assigned to A. G. A. Testing Laboratories; DGR-3-CH, "Research in Gas Operated Summer-Winter Hookups Extension—Study of Performance Characteristics of Gas Boilers Equipped for Hot Water and Space Heating Services," assigned to A. G. A. Laboratories.

Also DGR-4-CH, "Research in Corrosion, Oxidation and Deterioration of Metals Under the Influence of Products of Combustion of Gaseous Fuels," assigned to Battelle Memorial Institute: DGR-5-CH, "General Study of Performance of Central Heating Gas Furnaces Under Conditions of Varying Gas Inputs," assigned to A. G. A. Testing Laboratories; DGR-6-CH, "Effects on Combustion and Performance of Central Heating Furnaces and Boilers Resulting from Installation in Confined Spaces," assigned to A. G. A. Testing Laboratories; and DGR-7-CH, "Investigation of Factors that Contribute to Maximum Comfort Conditions in Houses Heated with Gas," University of Illinois.

Members and guests of Technical Advisory Group for Central Gas Space Heating Research: (Seated, l. to r.) Samuel J. Levine, Bloomfield, N. J.; Thomson King, Baltimore, Md.; W. M. Myler, Jr., chairman; Dr. F. E. Vandaveer, Keith T. Davis, both Cleveland, Ohio. (Standing) Eugene D. Milener, A. G. A.; Dr. H. A. Pray, Columbus, Ohio; G. C. Beck, Brooklyn; R. D. McNeice, Newark, N. J.; J. E. Lester, Atlanta, Ga.; Harold Massey, G. A. M. A.; W. B. Kirk, R. L. Stone, A. G. A. Testing Laboratories

D. W. Reeves, gas company general sales manager, presiding at Oklahoma City commercial sales meeting

Every man and woman a promoter

Selling is everybody's business in Oklahoma

Anywhere else a service man at a gas company commercial sales meeting would be like a fish out of water. But at the Oklahoma Natural Gas Company everyone from sales to office personnel takes an active part in promoting gas for commercial cooking. Service men, district sales managers, home service girls as well as salesmen, attend the commercial cooking sales meetings.

General Sales Manager, D. W. Reeves, who doubles as vice-chairman of the American Gas Association's Industrial & Commercial Gas Section, wants everybody in his company to sell commercial gas. He is assisted by L. J. Fretwell, chief commercial engineer, who acts as the sparkplug of the program.

It is worthy of note that Mr. Fretwell, while energetically pushing this commercial program, found time to promote house heating so vigorously that he was awarded the A.G.A. Gas Heating Progress Award for 1948, sponsored by The Coroaire Heater Corporation. This award is presented to a gas utility man for individual achievement in creating, maintaining and increasing consumer demand for gas house heating. Mr. Fretwell is also active as chairman, A.G.A. Commercial Processing Committee.

The Oklahoma company serves gas to 125 cities and communities which are scattered geographically and vary in size from large cities to small communities. It would be uneconomical and impractical to attempt to have commercial specialists contact the hundreds of commercial customers in all of these towns and communities. Commercial sales and service activities have, therefore, been made a district function with all sales, service and other employees in the district cooperating to the best of their ability in this direction.

These district personnel have been given specialized training in commercial sales and service work so that they can adequately accomplish the commercial sales activities in their districts. In the two largest cities, Oklahoma City and Tulsa, specialty commercial representatives are used. In the Oklahoma City district, C. A. Herbison is responsible for coordinating the commercial sales activities and in the Tulsa district, K. B. Nelson performs these functions.

Every company employee who might come in contact with a commercial customer is drafted into commercial contact work. The word "contact" is used rather than sales because utilities do not merchandise in Oklahoma. Couldn't if they wanted to. There's a law.

Mr. Fretwell says service men are high on his list of good commercial men. In his Louisiana drawl he puts it this way, "When a service man goes into an eating place everyone from the cooks to the owner is glad to see him, whether he is there in answer to a request for service or on a routine check-up. He is going to do something for them. He drinks more coffee than anybody in the gas business. Everybody wants him to sit down and have a 'cupacoffee'.

"He has the goodwill of the customers and their employees, knows them personally, and since he's the fellow who keeps their equipment working, they figure he knows more about it than anyone else. When he says they need new equiqment, they believe him. As far as they're concerned—he's not a salesman."

A flow of bulletins, manufacturer's literature and other pertinent commercial sales information is supplied to the district sales and service personnel engaged in commercial work. Field calls are made by the specialty commercial salesmen in order to maintain interest and to keep the local personnel up to date with what is new in commercial equipment.

Home Service girls are allies in the commercial cause, too. Mildred R. Clark, Oklahoma Natural's home service supervisor, and her girls cooperate and are in a position to offer good assistance. They are the company's closest contact with schools and can help promote the use of gas in school cafeterias. The home service people conduct special classes and demonstrations for home economics classes and get to know the school personnel. They often have advance information on proposed changes in cafeteria equipment.

Dietitians are highly important in fuel and equipment selection, particularly in hospitals and institutions. Home service people and dietitians have a common interest, the preparation of food. They are drawn together at meetings of associations to which they both belong, often are personal friends having attended school together. Home service personnel at Oklahoma Natural help keep the dietitians informed on gas usage.

At Oklahoma Natural's Stillwater office they even get to the embryonic commercial customers before they get out of school. Oklahoma A. & M. College is located in Stillwater and for each class in the school of hotel and restaurant administration a team composed of a service man and a home service girl presents a program on commercial equipment, its care and maintenance.

Oklahoma Natural's commercial program gets its biggest boost each fall when all personnel who are in any way associated with commercial promotion are brought in for a one day refresher course. One course is held in Oklahoma City for the company's western division and one in Tulsa for the easterners with approximately 65 assorted gas company executives and employees on hand for each of the meetings. The Oklahoma City meeting is usually held at the time of the state restaurant convention, this giving the gas people a chance to meet their customers at the convention and show them the latest equipment in the gas exhibit.

The programs at these annual meetings are all-commercial. Here's what was served up last October. The sessions were presided over by D. W. Reeves who opened the meeting with a discussion of the importance of the commercial load. He was followed by John J. Bourke, A.G.A.'s director of commercial cooking promotion, who showed the new commercial cooking film, "Where Food is Finest," and gave some suggestions as to how it might be used. (Oklahoma Natural purchased a print of the film and circulates it among the company offices as it is needed.)

Then Lloyd Goodson, an Oklahoma Natural distribution superintendent, gave a dramatic demonstration of the importance of correct pipe sizing. Mr. Goodson used a special gas piping arrangement connected on a panel board to illustrate graphically the effect of correct and incorrect piping as well as the correct use of an appliance regulator.

The piping arrangement on the board was connected to gas burners and by visual observations, pressure readings and readings from a gas meter, all effects of correct and incorrect gas piping, as well as proper functions and operation of gas appliance regulators were illustrated effectively.

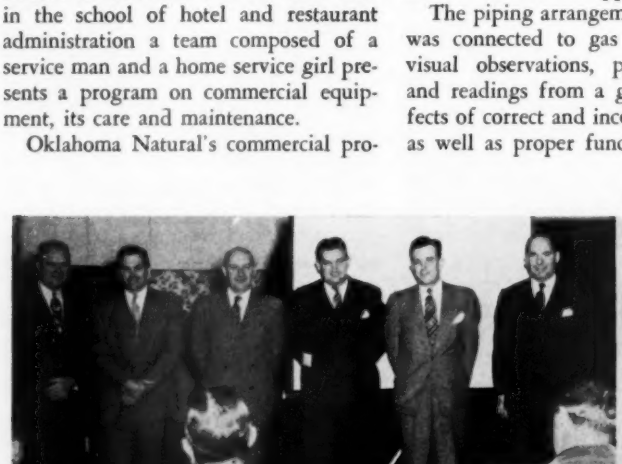
Mr. Herbison, one of Oklahoma Natural's full-time commercial men, gave an inspirational talk slanted toward the commercial service man, singling out the advantages of commercial service work. Following this talk, D. M. Baker, Oklahoma Natural's utilization engineer, presided over a session in which service men from various localities were called upon to review some of the problems they had encountered with commercial installations and how these problems were overcome. The final talk was a discussion of efficient kitchen layout by D. J. Brogan, sales manager of the G. S. Blodgett Co., manufacturer of bake ovens.

This entire program, props and personnel, was transferred en mass from Oklahoma City to Tulsa and was repeated there the following day.

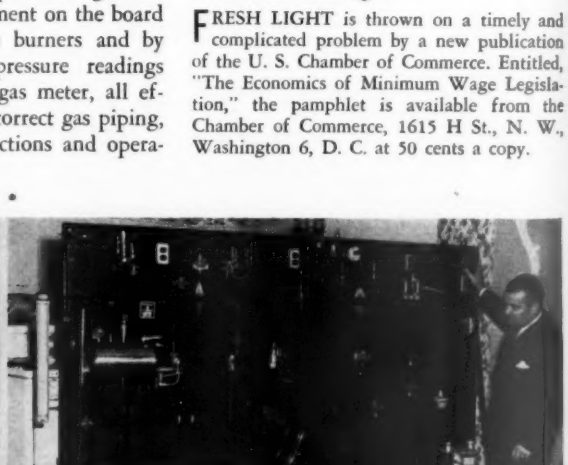
Oklahoma Natural has an abundant supply of natural gas in the very territory it serves and, consequently, the company offers very attractive rates. This, however, is not the whole story as to why you can almost count on your fingers the number of competitive commercial installations on their lines. The closely integrated commercial program is the dominant factor, and so long as this program continues as it has for the past several years, gas-cooked meals will be served in Oklahoma's hotels, restaurants, clubs, schools, hospitals and institutions.

Economics of minimum wage

FRESH LIGHT is thrown on a timely and complicated problem by a new publication of the U. S. Chamber of Commerce. Entitled, "The Economics of Minimum Wage Legislation," the pamphlet is available from the Chamber of Commerce, 1615 H St., N. W., Washington 6, D. C. at 50 cents a copy.



Speakers at Oklahoma City and Tulsa meetings: (L. to r.) D. W. Reeves, C. A. Herbison, Oklahoma Natural; D. J. Brogan, G. S. Blodgett Co.; Lloyd Goodson, D. M. Baker, Oklahoma Natural; John J. Bourke, A. G. A.



Lloyd Goodson, Oklahoma Natural Gas Co., pressing one of the many buttons that put into operation intricate demonstration board constructed at the gas company to emphasize visually the importance of proper piping.

Results with higher carbon oils reported to A.G.A. Gas Production Research Committee

Twin generator oil gas process

BY C. E. UTERMOHLE

Assistant to Superintendent, Gas Manufacturing, Consolidated Gas Electric Light and Power Co. of Baltimore

A PAR activity

IN view of the gas industry's interest in the production of high B.t.u. oil gas, the Gas Production Research Committee of the American Gas Association arranged and sponsored a series of tests using the less expensive—three percent and higher—carbon oils on an existing twin generator set at the Spring Gardens plant of the Consolidated Gas Electric Light and Power Co. of Baltimore.

At this plant in the fall of 1947 a 12x11x11 water gas set had been converted to the twin generator high B.t.u. oil gas process to assist in meeting peak loads through its increased thermal capacity. This process does not use a fuel bed, the heat requirements being substantially supplied by combustion of oil during the blast period. The production of a 1,000 B.t.u. oil gas from low—less than one percent—carbon oil by this process is well known and has been reported previously.*

This set was operated under test conditions on a three percent and a six percent carbon oil, as well as a 0.2 percent carbon oil for comparison. The test results, summarized in Table I, show that the hourly capacity using high carbon oils is approximately 70 percent of the capacity developed when using low carbon gas oil. The daily capacity is approximately 65 percent.

Bunker C oils of higher carbon content (9-13 percent) were not tried in the twin generator apparatus because six percent Conradson carbon appeared to be the practical limit in view of the down time for forced scurfing. The set can be successfully operated with higher carbon oils (3-6 percent) and a considerable saving in fuel cost will result because of the large price differential between gas oil and the higher carbon oils. When daily set capacity is important, as on days of peak send out, gas oil can be used to secure the high capacity required.

The author, Mr. Utermohle (above), is currently active in A. G. A. production research activities

Description and discussion

During the test periods the gas produced on this set was completely segregated and separately metered by Connersville positive displacement meters. After being metered the test gas was mixed with the balance of the plant production and the hydrogen sulfide removed. The volumes shown are corrected to a purified basis and to standard conditions of 60° F, 30″ Hg.).

All tests of gas quality were made on samples taken at the point of metering prior to oil scrubbing for gums and light oils. Therefore, the results reported are for unscrubbed gas. The tar from each test was collected separately and dehydrated, and the tar plus the light oils which distilled during the dehydration process were gaged into clean tanks. At the end of each test, samples for analysis were obtained of the tar and light oils as they were pumped out of these storage tanks.

The cycle was four minutes for the complete blow and make. The cycle consisted of approximately 50 percent blow time and 50 percent make time. However, the blow time was slightly shorter when using the two higher (3 and 6 percent) carbon oils than when using the 0.2 percent carbon gas oil because the quantity of make oil injected was smaller for the higher carbon oils and less blow was necessary to maintain set temperatures. A summary of the cycles used is shown in Table VI.

The sequence of operations is as follows (See sketch on next page)—

1. *Blast period to heat generators and superheaters.*

Air valves A_1 and A_2 are opened. After ten to 15 seconds (depending on the type of oil used) stack C is opened. Then heat oil valves HO_1 and HO_2 are opened. At the end of the blast period, valves A_1, A_2, C, HO_1 and HO_2 are closed.

2. *Make period.*

Steam valve S is opened and make oil valves MO_1 and MO_2 are opened. At the end of the make period valves MO_1 and MO_2 are closed and after a short steam purge valve S is closed.

The blast rates were approximately 13,000 c.f.m. in each generator, making a total blast rate of 26,000 c.f.m. The steam rates used were approximately 75 to 100 pounds per minute in each generator during the make oil injection period and 100 to 120 pounds per min-

* *A.G.A. Monthly*, July-August 1947, page 323. *Gas Age*, Sept. 30, 1948, page 65.

ute in each generator after the oil injection period. The higher rate was used to purge the set as rapidly as possible before the following blast period. Subsequent tests indicate that the steam used during the make oil injection period can be substantially reduced without affecting the operation of the machine or the characteristics of the gas produced.

The generators were checkered as follows:

Bottom six courses	4½"	space	fire-clay
Seventh course	1"	space	fire-clay
Eighth course	4½"	space	silicon carbide
Ninth course	1"	space	silicon carbide
Tenth course	4½"	space	silicon carbide
Eleventh course	1"	space	silicon carbide

The superheater was checkered with 36 courses of first quality fire-clay brick with two-inch spacing. All courses were staggered.

Preliminary tests on six percent carbon oil were made using fire-clay brick throughout but it was found that insufficient vaporization was obtained in the generators. A resulting greater amount of carbon was deposited in the superheater checkers and this carbon supplied more heat (when burned during the blast period) than was required for cracking during the subsequent make period. Superheater temperatures increased and overcracking of vapors resulted.

TABLE I—*Summary of Operating Results*

Conradson Carbon content of oil used, percent	.20	3.16	6.02
B.t.u. of gas per cubic foot	1088	900	970
Specific gravity of gas	.814	.811	.882
Heat oil, gals. per M.c.f.*	1.69	.99	.89
Make oil, gals. per M.c.f.*	11.42	12.70	12.39
Total oil, gals. per M.c.f.*	13.11	13.69	13.28
Tar, gals. per M.c.f.*	2.62	3.03	2.97
Gas made per hour, M.c.f.*	200	139	137
Gas made per day, M.c.f.*	4800	3128(a)	3083(a)
Thermal efficiency, percent	75.8	75.0	77.5

* 1,000 B.t.u. basis
(a) Based on 1.5 hours per day outage time to blast scurf.

The use of silicon carbide brick in the four top courses of generator checkers provided more rapid heat release in the upper zone of checkers and resulted in a more rapid and complete vaporization of the oil with the result that larger amounts of carbon were deposited in these checkers. When this carbon was burned (during the blow period) it heated the top zone where it is desirable to have as high a temperature as possible so as to obtain rapid vaporization of the make oil. Since more of the carbon was deposited in the upper courses of *generator checkers,* less was deposited in the superheater checkers and the superheater temperatures were thus more readily controlled.

TABLE II—*Oil Analyses*

Conradson Carbon, percent	.20	3.16	6.02
Gravity, °API	29.9	18.6	22.3
Viscosity at 122°F (S.F.) secs.	46.3*	20.5	22.8
Enriching value, M B.t.u. per gallon (Dick Method) avg. of 1400, 1500, 1600°F results	103.6	98.8	102.5

* at 100°F (S.U.)

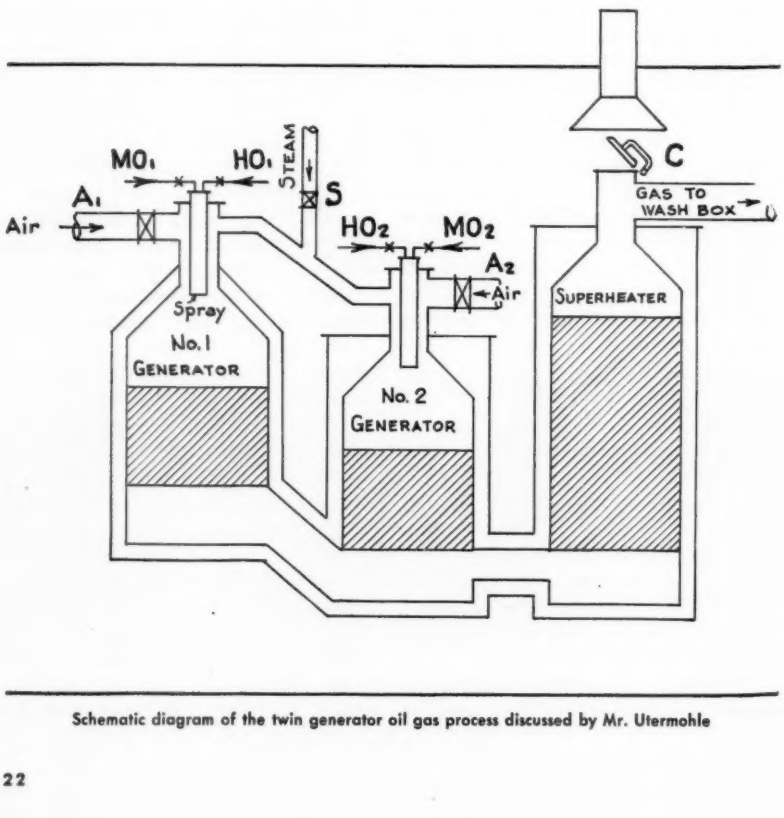
TABLE III— *Tar Analyses*

Conradson carbon content of oil used, percent	.20	3.16	6.02
Tar Analysis:			
Specific gravity	1.179	1.196	1.208
Free carbon, CS_2 Extraction, percent	10.60	12.33	14.09
Free carbon, C_6H_6 Extraction, percent	11.24	9.82	13.77
Unsulfonated residue			
Up to 300°C, percent	.63	.46	.66
300° to 355°C, percent	.15	.18	.29

However, when using either the three percent or six percent Conradson carbon oils even with the silicon carbide bricks, the difficulty due to excessive deposition of carbon in the superheater was not completely eliminated, although an excess of 3-5 percent oxygen was maintained in the blast gases at the stack. A summary of the blast gas analyses is shown in Table VII.

As the carbon deposit in the superheater increased, cracking conditions in the superheater gradually changed and more carbon was deposited. This resulted in the loss of temperature control and gradually increasing superheater temperatures as the additional carbon burned. It was found that when the set was shut down for one to two hours each day and blasted at the full air rate during the shut-down period, the carbon deposit was removed and operations would return to normal until the carbon deposit built up again.

The quality of the tar produced was comparable with the tar normally produced at the plant when making carburetted water gas and when using comparable oils and reforming approximately 10-15 percent of the oil used. Principal characteristics of the tar produced are *(Continued on page 44)*



Schematic diagram of the twin generator oil gas process discussed by Mr. Utermohle

A discussion of the advantages and disadvantages of applying the LIFO inventory method

Income tax depreciation study

By J. W. BALET

Consolidated Edison Co. of New York, Inc., New York, N. Y.

The effect of present high prices as reflected in corporate income statements has become a subject of general discussion. It is frequently contended that income set forth in monetary terms is overstated and is substantially higher than the correct economic income. One of the principal causes of income overstatement is ascribed to insufficient provision for depreciation. The argument is advanced that depreciation based, as it now generally is, on historical cost does not provide for the replacement of capital assets at current high prices. To correct this situation, various proposals have been made that depreciation be computed on the replacement value of capital assets rather than on historical cost.

There has been some advocacy of replacement value as a basis for income tax depreciation. However, the long time statutory sanction of the cost convention raises serious doubts that a change to replacement value would be accepted by the Congress, particularly if it involved a substantial loss of revenue. For this and other reasons, various suggestions have been made that the present depreciation policy of the Bureau of Internal Revenue be revised by legislative enactment without changing the cost basis on which depreciation is now computed. The objective of most of these suggestions is to increase current depreciation allowances.

One of the suggested revisions of depreciation is the application of the last-in first-out, or LIFO method of inventory valuation to income tax depreciation. The inventories to which LIFO now may be applied are analogous to that known as materials and supplies in the utility industry. Included in materials and supplies are such inventory items as coal and oil that are used in current operations. These inventories consist of assets that turn over rapidly, the period of turnover being frequently measured in months. The type of assets which would be involved in the application of LIFO to depreciation is depreciable property which turns over slowly, the period of turnover being measured in years. However, before discussing LIFO as applied to depreciation some consideration must be given to the LIFO inventory method, especially to those features that affect income tax treatment.

J. W. Balet

THE accompanying article was prepared exclusively for the MONTHLY and is the second of two articles discussing income tax problems (see January 1949 MONTHLY, page 27). The author, Mr. Balet, is currently active in Taxation Accounting Committee work of the American Gas Association and Edison Electric Institute. He is now manager of the federal income tax bureau of the tax department, Consolidated Edison Co. of New York, Inc., and has been active in forecasts and statistics, budgetary programs, depreciation studies, and tax matters for the past 15 years.

The LIFO method assumes that the goods last purchased are first sold, and the goods remaining in an inventory are those first purchased. The original concept of LIFO was based on the flow of goods where, for example, lumber, ore, steel or other material is added to and taken from the top of the storage pile. Now, LIFO is generally considered as a method of matching current costs with current revenue so that the cost of goods sold may more quickly be brought up to a higher price level. The effect of LIFO as compared with first-in first-out, or FIFO, is to decrease taxable income during a period of rising prices by increasing the cost of goods sold; and, vice versa, income is increased when prices are declining. In making a comparison of LIFO with first-in first-out, it should be realized that a first-in first-out inventory may be valued by one of several pricing methods, such as cost or market whichever is lower, average cost, etc., and that the inventory may be taken on an annual or perpetual basis.

LIFO for inventory purposes was first made available to all taxpayers through the Revenue Act of 1939. However, certain conditions are imposed on the taxpayer's election to use LIFO. One of these conditions is that the inventory must be taken at cost, regardless of market value. Goods in the opening inventory of the taxable year for which the method is first used must be considered as having been acquired at the same time and must be valued at the average cost of all units in the inventory. Also, the taxpayer must not use an inventory method other than LIFO in reports to stockholders, or for determining income for credit purposes. Finally, the LIFO method, once adopted, must be adhered to in all subsequent taxable years unless a change to a different method is approved by the Commissioner of Internal Revenue.

Under the conditions imposed by the Internal Revenue Code and Regulations, no deviation from the cost convention is permitted where LIFO is used. Furthermore, a taxpayer is not given the advantage of hindsight when he elects to use LIFO. And once having received the benefit of LIFO during a period of rising prices, a taxpayer must suffer its

penalties when prices are declining.

The Revenue Act of 1942 amended the Code for taxpayers using LIFO to give relief from the consequences of involuntary liquidations of inventories during the war years. At the election of the taxpayer, the taxable income for the year in which the involuntary liquidation occurred may be decreased by an amount equal to the excess of the replacement cost of the liquidated inventory over its actual cost. Conversely, if the replacement is below the actual cost the taxable income must be increased by an amount equal to the excess of actual over the replacement cost.

The relief afforded by this section is not operative unless the liquidated inventory is actually replaced within three years after the end of the war and the election, once made, becomes irrevocable. Further, the closing inventory for the year of replacement must include the goods replaced at the same cost as the goods liquidated. Attention is directed to this section of the Code because it has become the basis of one of the specific proposals for applying LIFO to depreciation.

Inventory concept

To conceive of LIFO as applied to depreciation, it is necessary to think of depreciable property as a long-term inventory which ultimately will become part of the cost of goods sold. Additions to depreciable property are then similar to merchandise bought for manufacture and sale. And the part of the cost of goods sold that represents depreciable property is the opening inventory, plus the additions during the year, less the closing inventory. However, there is this difference in the case of depreciable property, the cost of goods sold is not charged directly against gross income.

Most utility plant accounts are supported by continuing or other detailed property records. These records, which in many cases start with an inventory of the property, are carried forward year after year by adding the cost of the property brought into service during the year and retiring the property taken out of service. Actually, the retirements are the difference between the opening plant investment plus the additions, and the closing plant investment.

Under the inventory concept, the retirements are the part of the goods sold that represents depreciable property. The application of LIFO to the property investment would require that original cost be abandoned and property retirements be priced at the cost of the last additions, which would be approximately the current cost of replacements.

The pricing of retirement at replacement cost presents some difficult practical problems. Where retired property is immediately replaced with like and kind, the pricing might be relatively easy, or where property is retired and not replaced, original cost might be used. But where retired property is replaced with dissimilar property, the selection among several possible pricing methods would present hard choices. To mention a few: (1) Should retirements be priced at reproduction cost new; (2) Should they be priced at replacement cost of unlike units adjusted for differences in capacity or size; or (3) Should they be priced at original cost, adjusted for rises in the general price levels?

The majority of property retired by a utility is replaced by dissimilar property and reflection on a few examples quickly indicates how difficult the pricing problem could be: several small vertical turbo generator units are replaced with a single large unit; small obsolete meters are replaced with larger meters; a direct current distribution system is replaced with an alternating current network. These few examples confirm what is generally apparent; that the long life and rapid technological improvement of most utility property complicate the replacement pricing of property units first installed many years before.

It was noted earlier that the election to use LIFO for inventory purposes required that the goods in the opening inventory be considered as having been acquired at the same time and must be valued at the average cost of all units in the inventory. Were the acceptance of a similar condition required for the application of LIFO to depreciation, pricing at replacement cost would be rendered still more complex for many utilities. A utility with its property records now established on an original cost by year of installation basis would be required to place all costs on an average basis. For inside plant, particularly, the utility would be involved in attempts to average costs of dissimilar units.

However, let us assume that a reasonably satisfactory procedure has been established for the replacement pricing of property retired. The next problem would be how and where to record the retirements. Most regulatory authorities direct that utility plant accounts record original cost. Continued insistence on this requirement would mean that income tax retirements would have to be recorded in auxiliary records. Such auxiliary records would have to include the detailed data and computation necessary to transform the original or average cost used in the present plant accounts to the replacement cost to be used for income tax purposes. It readily can be imagined that the auxiliary records would be voluminous, complex and costly to maintain.

After the pricing and recording problems are solved, it must be decided how to give effect to LIFO property retirements. LIFO as applied to income tax depreciation either can include the effect of LIFO retirements directly in the depreciation deduction, or as a separate item of deduction. The incorporation of LIFO directly into depreciation, which involves the accrual of a depreciation reserve, will be discussed first.

Inventories which are an income determining factor, whether valued by LIFO or other means, are brought into taxable income through the cost of goods sold. As noted previously, the cost of goods sold is obtained by taking the difference between the inventory at the beginning of the year, plus the goods bought for manufacture or sale during the year, less the inventory at the end of the year. Thus, the withdrawals or retirements of inventory are in effect charged directly against income. This is not the case with utility property retirements which, for depreciation purposes, are usually charged to the depreciation reserve and do not enter directly into the depreciation expense deduction.

Annual deduction

The purpose of income tax depreciation is to permit an annual deduction from gross income for the ratable recovery of the cost or other basis of property subject to exhaustion, wear and tear, and obsolescence, over its useful life. Depreciation may be computed either by applying a depreciation rate, usually expressed as a percentage, to the cost or other basis, or by dividing the unrecovered cost or other basis by the remaining useful life. In both computations, retirement of property reduces the depreciation deduction by an amount equal to the product of the depreciation rate and the retirements. If LIFO is adopted and the retirements are in-

creased in amount, the depreciation deduction will be decreased if no further change is made in the computation. Obviously, this is not the expected result of the application of LIFO to depreciation.

Consequently, if the benefits of LIFO are to be included directly in the depreciation deduction it is necessary to revise either the depreciation rate or the useful life. One of the suggested methods of giving effect to LIFO is to increase the depreciation rate in proportion to the percentage increase in LIFO retirements over original cost retirements. As an alternative, a revised depreciation rate might be computed through the use of retirement ratios developed from LIFO retirements.

In either case, the current depreciation deductions would be substantially increased because LIFO retirements would be much larger than original cost retirements. As future retirements come to include newer property installed at higher prices, the spread between LIFO and original cost would shrink. The net result, however, would be that the portion of the total property cost recovered in the early years would be larger than depreciation based on original cost retirements. Unless prices were to decline, the property would be fully depreciated some time before the end of remaining life and no depreciation would then be allowed even though the property continued in use.

Increase in deductions in proportion to the increase in retirements or retirement ratios has the further objection that it assumes the amount of the depreciation deduction is directly related to the amount of current retirements. Current retirements are one of the factors in determining the amount of annual depreciation, but it is doubtful if there is any significant direct relation in most cases.

The second method of introducing LIFO directly into the depreciation deduction involves the method of spreading the unrecovered cost over the remaining useful life. In this case, the remaining useful life would be decreased to take LIFO into account. A simple example will illustrate how this could be done.

Assume a group of depreciable property composed of two units with a service life of 30 years each. The first unit has an original cost of $15 and a remaining life of ten years. The second unit has an original cost of $30 and a remaining life of 25 years. Further, $15 of allowed depreciation has been accrued against the two units so that the unrecovered cost of the group is $30 or the difference between the total original cost and the $15 accrued depreciation. With original cost pricing, the average remaining life of the group is 20 years and the annual depreciation is $1.50, or the unrecovered cost of $30 divided by 20 years. Under LIFO, the remaining life would become 15 years and the annual depreciation would be $2 or the unrecovered cost divided by 15 years.

Although the second unit cost twice as much as the first, the depreciation under LIFO is increased only one-third under the second method. The one-third mark-up in depreciation will continue until the first unit is retired at the end of ten years. After that time the annual depreciation will be one-third less than it would have been had original cost been used throughout. The method results in accruing depreciation at all times throughout the life of the property. To this extent it is more in accord with the present concept of computing depreciation over the entire life of the property than is the first method of increasing depreciation *(Continued on next page)*

Meet the men behind the scenes

H. B. Wakeman | M. J. Walsh | Louis Stoecker | A. C. Haake | D. C. Gillespie

● **Howard B. Wakeman,** Long Island Lighting Co., Mineola, N. Y., chairman, Customer Relations Subcommittee on Customer Attitude Toward Collection Notices, describes this project as a review of customers' attitudes toward the various types of collection notices. Committee personnel are experimenting with an unusual approach to the subject emphasizing changes which will make the notices more acceptable. The study is to be completed for the Detroit meeting.

● **M. J. Walsh,** Consolidated Edison Co. of New York, Inc., chairman, Customer Accounting Subcommittee on Customer Accounting Costs and Production Comparisons, announces that his group is endeavoring to develop production yardsticks for meter reading, cashier, billing and cash posting operations. A major part of the project is a statistical analysis of the number of employees per 10,000 meters. Findings will be presented to the industry at the 1949 spring conference.

● **Louis Stoecker,** Public Service Electric and Gas Co., Newark, N. J., chairman of the Customer Relations Subcommittee on Favorite Customer Relations Procedures and Practices, reports that his group is studying several discussion-provoking practices that have general adaptability to meeting, greeting and treating customers by the utility industry in its everyday contacts. Their findings will launch a round-table discussion at the Customer Relations Luncheon in Detroit this spring. At this luncheon anything goes. It is an off-the-record meeting where one may take either side of a question with the utmost freedom.

● **A. C. Haake,** The Peoples Gas Light and Coke Co., Chicago, Ill., chairman of the Customer Accounting Subcommittee on Mark Sensed Meter Reading, reports that his group is concentrating its investigation on the effect this new method may have on underlying records. Their findings will be presented at the 1949 Spring Conference in a panel discussion. At that meeting they will endeavor to answer vital questions about how underlying records and customer inquiry operations are affected.

● **D. C. Gillespie,** United Fuel Gas Co., Charleston, W. Va., chairman of the Customer Accounting Subcommittee on Meter Reading Sheets and Bill Forms, describes his committee's project as an analysis of the forms used by the industry. The results of the survey will be disclosed at the 1949 Spring Conference. The written report will be supplemented by an exhibit of meter reading sheets and forms mounted on large easels with a condensed statement calling attention to the outstanding and unique features.

in proportion to retirements. However, it will not increase the present depreciation deductions by as large an amount as the first method.

This simple example illustrates the effect of introducing LIFO into depreciation through a revision of the remaining life. However, we should not be mislead into thinking that the actual application of LIFO to a grouped utility property would be equally simple. On the contrary, it would require such arbitrary assumptions and complex computations that an equally sound and practical answer might be obtained by revising remaining life by the exercise of judgment. In the latter case, there would be no point in using LIFO.

Introducing LIFO

The two methods of introducing LIFO directly into the depreciation deduction which were chosen to illustrate the basis on which the computations might be made, do not exhaust all possibilities. But consideration of the two methods does indicate that the computation of depreciation through LIFO gives rise to problems almost as difficult of solution as the pricing and recording of retirements under LIFO.

Another possible method of applying LIFO to depreciation would be through a deduction separate from the depreciation allowance. This approach relies for its theoretical support on the Code section allowing relief from involuntary liquidation of LIFO inventories. It will be recalled that if an inventory is liquidated and replaced at higher prices, net income may be decreased by the excess of replacement over actual cost. The suggestion has been made that similar relief be granted for capital assets and in the event that property was retired and replaced, the excess of replacement cost over actual cost would become an adjustment of net income. Presumably, depreciation would continue to be based on actual cost of the property and remain almost undisturbed.

The involuntary liquidation relief section provides that the closing inventory for the year of replacement must include the goods purchased as replacement at the same cost basis as the goods liquidated. Were a similar condition established for capital assets, the basis of the new property would be the cost of the old property retired and replaced. Such a provision would reduce the depreciable base and, in turn, reduce future depreciation deductions. But the immediate effect of the liquidated inventory method would be to increase income tax deduction by an amount dependent on the amount of retirements and the excess of replacement over actual cost.

The liquidated inventory method would not solve the problems of pricing and recording retirements which were discussed earlier. Furthermore, its effect is to split the depreciation deduction into two parts; the first of which is a provision for normal depreciation and the second a provision for retirement losses. The retirement loss part is, of course, the excess of replacement over retirement. It is many years since most utilities changed from retirement to depreciation accounting for income tax purposes, and a partial reversion to retirement accounting would be an abrupt change from current trends as well as a backward step.

The discussion has thus far been confined largely to consideration of some of the practical problems that would arise if LIFO were applied to depreciation. Attention is now directed to the advantages and disadvantages of the application of LIFO at different price levels.

The first and possibly most important point about LIFO, as presently defined by the Internal Revenue Code, is that it does not permit a departure from the cost convention. Its main effect is to allocate the total actual cost in different annual amounts than is the case with other methods. For inventories, an advantage over the first-in first-out method is obtained through LIFO during a period of rising prices by allocating more of the cost of the base inventory to the current year. The base inventory referred to here means the normal inventory that a business needs to carry on its current operations. If prices stabilize at a high level, the initial advantage gradually disappears as the inventory turns over but so long as prices do not decline and a base inventory is maintained, a penalty is not incurred to match the advantages secured in the past.

In the application of LIFO to depreciation, an advantage would be secured as prices rise. If prices stabilize at a high level, the advantage not only will disappear but will gradually give way to lower depreciation deductions that will penalize the taxpayer to the extent of any advantage he obtained in the past. It should be noted again that there is no similar penalty for LIFO inventories. The explanation of this difference is that depreciable property is subject to amortization and inventories are not. Under Bureau of Internal Revenue Regulations, the deduction for depreciation is the ratable amount of unrecovered cost spread over the remaining useful life. Decreasing unrecovered cost by larger depreciation deductions in the early years will inevitably lead to smaller deductions in later years.

When prices fall, the LIFO inventory penalizes the taxpayer as cost of the goods sold is reduced below the similar cost from a first-in first-out inventory. As previously noted, the conditions imposed on the application of LIFO to inventories make it certain that a taxpayer once receiving the benefit of LIFO must also suffer its possible penalties. If the restrictions presently enforced for inventory purposes are imposed on LIFO for depreciation purposes, a penalty will be exacted to match past benefits if prices decline. In the case of LIFO depreciation, the penalty will be compounded because smaller unrecovered costs of depreciable property will remain after a period of rising prices has ended.

There is a further factor to be considered when measuring the immediate advantage of LIFO as applied to depreciation during a period of rising prices. Earlier, in describing LIFO for inventory purposes, attention was directed to the restriction imposed on the election to use LIFO, whereby the taxpayer must not use an inventory method other than LIFO in reports to stockholders or for determining income for credit purposes. Let us assume that Congress sanctions LIFO for depreciation, but imposes a restriction that no other method may be used in reports and for credit purposes. Even though the utility industry should then elect to use LIFO for tax purposes, the State Commissions might not accept the LIFO method for regulatory purposes. In that event, utilities would be effectively barred from the use of LIFO and industrial taxpayers would be given a tax advantage denied to utilities.

Consequences

Even though the State Commissions were to accept LIFO depreciation, the use of LIFO might involve undesirable consequences. At the present time, the annual depreciation charges of electric and gas utilities are equal to approximately half of *(Continued on page 44)*

Washington restaurant show

Points of interest at the Washington restaurant show. (Left) Connie Rallis, co-inventor of gas-fired Vulcan Flavorizer, and chef, testing meats before they were served to guests. (Below) Part of the heavy duty commercial gas equipment exhibited in joint display of Washington Gas Light Company and appliance manufacturers. (Bottom) A 52-foot long battery of stainless steel commercial gas ranges which is believed to be the largest display of stainless steel equipment of its type ever shown. These ranges were scheduled to be installed in St. Elizabeth's Hospital in Washington, D. C. following the restaurant show.

Another important showing of the American Gas Association's new sound-color film, "Where Food Is Finest" was given recently during the Southeastern Regional Restaurant Convention and Exposition sponsored by the Washington Restaurant Association at the Hotel Statler in Washington, D. C. Approximately 7,500 people attended the convention from 31 states and five foreign countries.

One complete aisle in the main exhibit hall was occupied by a mammoth gas display of the Washington Gas Light Company in cooperation with manufacturers of heavy duty equipment. All stainless steel appliances were included in the display. Cooperating with the gas company were Standard Gas Equipment Corp.; Anetsberger Brothers, Inc.; Lawson Manufacturing Co.; American Stove Co.; J. C. Pitman & Sons, Inc.; Lyons-Alpha Products Co.; Crane Co.; The Cleveland Range Co.; Magikitch'n Equipment Corp.; Savory Equipment, Inc.; A. O. Smith Corp.; The G. S. Blodgett Co., and Detroit-Michigan Stove Company.

Visitors saw, in addition to the main exhibit, a 52-foot battery of stainless steel ranges said to be the largest display of stainless steel equipment of its type ever shown.

Included on the program was a cooking demonstration of Vulcan Flavorizers from which more than 2,000 people were served pork loin, roast beef, hams, turkey, fish and lobster, in two two-hour sessions. A baking demonstration of various types of pastries was conducted under the auspices of Standard Brands, Inc.

Numerous speakers of national repute participated in the convention sessions, including J. Willard Marriott, president, National Restaurant Association.

First of Residential Section's two spring meetings will stress need for intensive selling

Eastern Natural program set

The theme "Get out and sell it" has replaced "Come in and select it" as the gas utility sales manager's credo for 1949, and the Eastern Natural Gas Regional Sales Council has arranged a program complete with ideas on how to sell gas and gas appliances for its annual conference at the William Penn Hotel, Pittsburgh, March 14 and 15, under the sponsorship of the Residential Gas Section, American Gas Association.

Raymond Little, general sales manager, Equitable Gas Co., chairman of the Eastern Natural Gas Regional Sales Council, and his program committee have secured a long list of outstanding speakers to present the many facets of salesmanship during the two-day conference. Selling the gas industry to itself and to the public will be the theme of the keynote address by Robert W. Hendee, president, Colorado Interstate Gas Co., and president, American Gas Association, in opening the program on Monday, March 14. The importance of home service in keeping the public sold will be dramatized in a sketch by a bevy of beauties from the Equitable Gas Company, utilizing a variety of gas appliances.

The coming year will see an intensive sales, advertising and promotion campaign waged in automatic gas water heating. Stanley G. Gorman, sales promotion director, water heating division, Gas Appliance Manufacturers Association, will present the new "Court of Flame" program, destined to glamorize the automatic gas water heater.

The coordinated advertising and promotion effort carried on by A.G.A., gas utilities, gas appliance manufacturers and dealers last year, avalanched into an $8 million campaign and resulted in a rise of nearly 25 percent in sales of gas ranges of all types, with "CP" range sales increasing 300 percent. Competitors admit the success of the Gas Has Got It campaign and are doing something about it. Cecil Dunn, Estate Heatrola Division, will highlight some of the salient features of modern automatic gas ranges built to "CP" standards that can be used to offset competitive sales effort.

James E. Humphreys, advertising and sales manager, The Ohio Fuel Gas Co., Columbus, will chairman the afternoon meeting.

The home service departments have proven to be most valuable allies of the gas utilities sales departments and Jessie McQueen, A.G.A. home service counselor, will present a few of the many activities through which home service girls promote domestic utilization of gas.

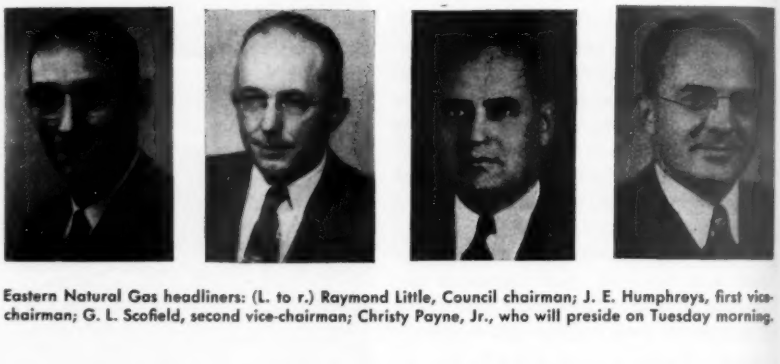
The A.G.A. House Heating Committee has been active in a program of upgrading gas house heating installations as a basis of sales operations until full-scale efforts in this important field can be resumed. H. Preston Morehouse, assistant sales manager, Public Service Electric & Gas Co., of New Jersey, and vice-chairman, A.G.A. Residential Gas Section, will review the work of the House Heating Committee along these lines.

A new gas heating appliance made its initial bow at the recent A.G.A. convention in Atlantic City and attracted great attention. Marvin Smith, vice-president, Muncie Gear Works, Inc., Muncie, Ind., will have an interesting story to tell on the gas heat pump. He will outline its operating and installation costs, its market potentialities and its possible effects on peak loads.

Cy Young, research engineer for The Gas Service Co., Kansas City, Mo., has devoted considerable time and effort seeking solutions to the peak load problem. He will discuss a new combination gas and oil burner that can be switched from one fuel to the other in periods of short supply, as one means of shaving peak loads for the gas industry.

Top management is becoming increasingly alert to changes in public opinion and in markets. Methods for changing management policies to meet the new trends will be presented in an inspirational talk by Professor Erwin H. Schell, head of business administration, Massachusetts Institute of Technology, as the closing address of the Monday afternoon session.

Sales of utility gas and sales of gas appliances are so closely interdependent as to be almost inseparable. The Conference Program Committee, with this truth in mind has devoted the major emphasis on Tuesday's program to gas



Eastern Natural Gas headliners: (L. to r.) Raymond Little, Council chairman; J. E. Humphreys, first vice-chairman; G. L. Scofield, second vice-chairman; Christy Payne, Jr., who will preside on Tuesday morning.

appliances. Christy Payne Jr., vice-president, The Peoples Natural Gas Co., Pittsburgh, Pa., will be presiding chairman at the morning session on Tuesday. Frank J. Nugent, sales promotion director, Byrant Heater Co., Cleveland and president, G.A.M.A., will forecast what is ahead for gas appliances in 1949.

C. H. Rippe, sales director, home appliance division, Hamilton Manufacturing Co., Two Rivers, Wisc., will discuss the market possibilities and load building potential of the automatic gas laundry dryer. Gas incineration is another fast growing use for gas, and Dr. A. W. Gauger, The Pennsylvania State College, will report results of research and technical studies made in this field under the A.G.A. Domestic Gas Research Program.

From the sales manager's point of view, gas incineration has many advantages and Ira J. Rapson, assistant to sales manager, Michigan Consolidated Gas Co., Detroit, will present some of these points in discussing his company's sales and promotional program.

George L. Scofield, assistant to president, Republic Light, Heat & Power Co., Buffalo, N. Y., will act as chairman at the afternoon session on Tuesday. Aggressive dealer cooperation is a salient part of sales programs of many utility companies. Frank J. Stiening, Hamburg Brothers, Pittsburgh, will discuss techniques employed by his company in selling gas refrigeration in today's highly competitive market.

James F. Howley, manager of dealer relations, The Brooklyn Union Gas Co., has guided a most successful dealer program for his company for some years. He knows that realistic dealer participation pays off and he will give several reasons why this is true.

W. S. Redpath, Ketchum, MacLeod & Grove advertising agency, Pittsburgh, Pa., will stress the necessity of tieing in the national advertising of A.G.A. and the "CP" range manufacturers at local levels during a talk at the afternoon session on Monday.

As closing feature of the conference, the Council will show a full-color slide film, "Our Silent Partner," portraying natural gas from its development in the field to its ultimate use by the consumer.

Gas appliance manufacturers will be hosts to the conference at a Friendship Room from 5:30 to 7:30 P.M. on both days of the meeting.

Mid-West sales agenda impressive

All roads lead to the Edgewater Beach Hotel in Chicago which will be the locale, March 28-30, of the 1949 Mid-West Regional Gas Sales Conference sponsored by the Residential Gas Section, American Gas Association. This conference is one of the largest and most effective held by the gas industry and is attended by hundreds of gas company sales managers, executives and representatives of the major domestic gas appliance manufacturers from all parts of the nation.

W. L. Hayes, general sales manager, Montana-Dakota Utilities Co., Minneapolis, Minn., is chairman of the A. G. A. Mid-West Regional Gas Sales Council. R. J. Vandagriff, general sales manager, The Laclede Gas Light Co., St. Louis, Mo., is vice-chairman.

Greater importance

This year the conference assumes even greater importance in view of the definite return of the buyer's market and the accentuated need for the industry to step up its sales and promotional activities in face of ever-increasing competitive efforts for the domestic market.

The 1949 conference will feature effective and dramatic presentations on all phases of domestic gas business. The program will include an important presentation on the combination gas and oil burner which is being successfully utilized by a large number of gas companies in shaving peak loads. A discussion of economics and business conditions by the president of one of the largest gas appliance manufacturers will be one of the highlights. Presentations on gas cooking, home service, LP-gas, sales training, sales promotion and public relations will be given by important speakers from within and out of the industry.

Nationally known speakers who have been invited to address the conference include Carl V. Haecker, sales promotion manager, Butler Brothers, Chicago, Ill.; Dr. Irving J. Lee, school of speech, Northwestern University; Henry W. Persons, manager, Chicago division, Mutual Life Insurance Co., and Dr. Clark S. Kuebler, president, Ripon College, Ripon, Wisconsin. Last, but by no means least, will be an inspirational address by Dr. Kenneth MacFarland, superintendent of schools, Topeka, Kan., who was one of the hits of the 1947 conference and is being invited to play a return engagement.

W. L. Hayes (left), chairman, Mid-West Sales Council, and R. J. Vandagriff, vice-chairman

Another important event will be the annual dinner and entertainment on the evening of March 29. Dinner tickets are provided as part of the conference registration fee.

Copies of the advance program including a hotel reservation card will be sent to all gas utility companies and gas appliance manufacturers in the 11 Midwestern states covered by the conference.

Going...

Going...

COPIES of the American Gas Association "Reference Manual of Modern Gas Service," specially designed for the architectural and building professions, are going very fast.

This important publication for architects and builders has proved to be an excellent new home load builder. A limited number of copies of the manual are still available and may be ordered from the American Gas Association at $7.50 per copy, f.o.b. New York.

W. R. FRASER, *CHAIRMAN* • ERNEST G. CAMPBELL, *VICE-CHAIRMAN*

How to develop safe methods of storing, handling and using liquefied petroleum gases

LP-gas safety requirements

E. O. Mattocks

By E. O. MATTOCKS

Phillips Petroleum Co., Bartlesville, Okla.

Liquefied petroleum gases consist usually, as shown in Figure 1, of propane, propylene, butanes (normal butane and isobutane), butylenes, or mixtures of them. This type of gas is referred to commonly as LPG and LP-gas.

Before a safe method of storing, handling, and using LPG can be developed, it is necessary to be well acquainted with their physical properties. Liquefied petroleum gases are gaseous at normal atmospheric temperatures and pressures, but are readily liquefiable for ease of handling by application of moderate pressures at atmospheric temperatures.

One of the most important physical properties of liquefied petroleum gas is its vapor pressure. If the vapors above the liquid are in equilibrium with the liquid, the pressure exerted by the vapor will depend directly upon the temperature of the liquid. Each of the hydrocarbons existing in liquefied petroleum gas exerts a different pressure at a given temperature. The vapor pressures for the various hydrocarbons at various temperatures are presented in Figure 2.

Upon heating, the volume of liquid LPG in a container will increase appreciably, due to its relatively large coefficient of expansion.

Frequently reference is made to the greater inflammability of LPG as compared to other commercial gases. Table I gives the limits of inflammability of most commercial fuel gases and several common hydrocarbons including LPG. The lower limit represents the minimum percent of gas in air which will support combustion, while the higher limit represents the maximum percentage of gas in air which will support combustion.

Compared with the data for LPG, the lower limit for natural gas is 4.8 percent gas in air and the upper limit is 14.6 percent gas in air which represents a spread of 9.8 percent. Similarly the lower limit for carburetted water gas is 6.4 percent gas in air and the upper limit is 37.7 percent gas in air which represents a spread of 31.3 percent.

From these data it is seen that the limits of inflammability are less for LPG than for most other commercial fuel gases. It is true, however, that the lower limit for LPG is lower which means that it requires less LPG in air to reach the inflammable range than for other commercial fuel gases.

The boiling point of a gas is of interest, since this is the maximum temperature at which the material will exist as a liquid at atmospheric pressure. Table II shows the boiling points of a number of common fuel gases. It will be noted that while propylene has a

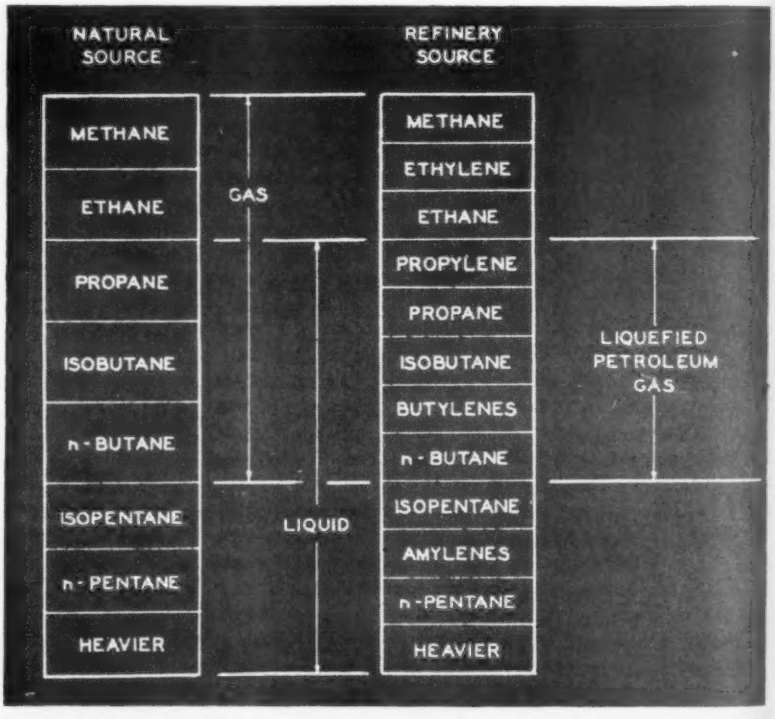


Figure 1. Hydrocarbons which are derived from petroleum. Liquefied petroleum gases consist usually of propane, propylene, butanes (normal butane and isobutane), butylenes, or mixtures of them

Presented at Technical session during 1948 American Gas Association Convention in Atlantic City.

boiling point of a minus 53.8° F, normal butane boils at plus 31.1° F. At atmospheric pressure if the temperature is above the boiling point only a vapor will exist; if the temperature is below the boiling point liquid will exist. It is necessary therefore if a material is to exist as a gas that its temperature be maintained above its boiling point. It should be remembered that the boiling points given in Table II are for atmospheric pressure. If the pressure is above atmospheric the boiling points are at a higher temperature.

Transportation

LPG is transported from the source of production to dealers and to the ultimate consumers through pipelines, railroad tank cars, motor tank trucks, motor tank semi-trailers, motor tank trailers, skid tanks, and containers constructed according to the specifications of the Interstate Commerce Commission (ICC).

Transportation of LPG in pipelines is generally from the source of production to pipeline terminals or to large consumers. It is moved frequently in the same line as used for other petroleum products. At the end of the pipeline, storage containers are installed in a manner similar to the storage located at consumers' premises.

Railroad tank cars for the transportation of LPG are built according to the specifications of the ICC and the Association of the American Railroad (AAR). The specifications of this container are such that although railroad tank cars have been involved in all types of wrecks, fires, and various types of accidents, there is no known record of one of these tanks being ruptured or punctured so as to cause a leak.

Containers on motor tank trucks, motor tank semi-trailers, and motor tank trailers used for the transportation of LPG are constructed according to the requirements of the American Society of Mechanical Engineers (ASME) Unfired Pressure Vessel Code or the joint American Petroleum Institute and American Society of Mechanical Engineers (API-ASME) Unfired Pressure Vessels for Petroleum Liquids and Gases Code. These containers are similar to those used for stationary storage of LPG. The regulations and requirements for this type of movement are promulgated by the ICC for both interstate and intrastate shipments.

Small portable containers up to a maximum water capacity of 1,000 pounds are constructed according to the specifications of the ICC. These are generally considered portable and move from the distributors filling plant to the consumers location in trucks. The larger containers frequently are filled at the consumers location from tank trucks.

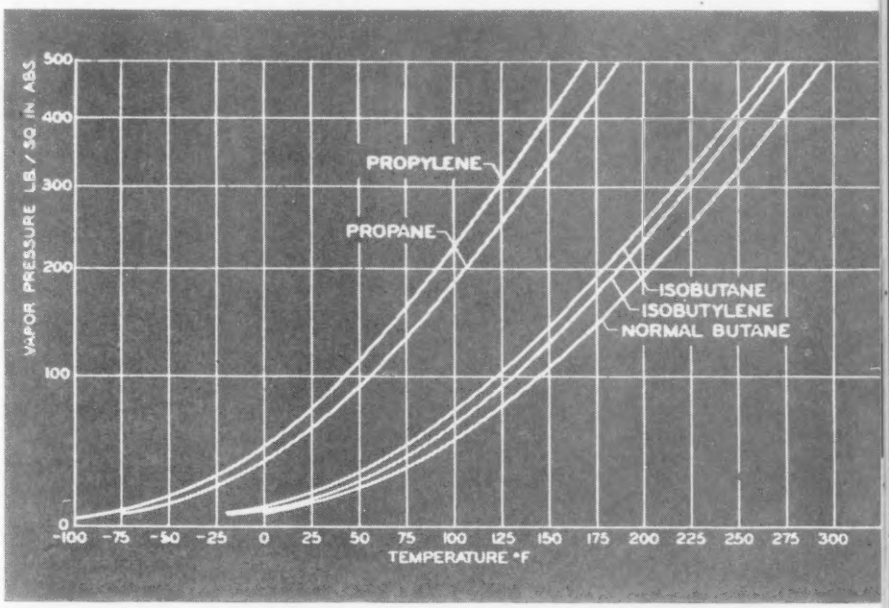


Figure 2. Vapor pressures for the various hydrocarbons computed at different temperatures

Containers used for stationary storage are constructed according to the requirements of the ASME Unfired Pressure Vessel Code or according to the requirements of the joint API-ASME Unfired Pressure Vessel Code. Containers mounted on motor trucks, motor semi-trailers, motor trailers as well as skid tanks are also constructed according to the same requirements.

Permanent located-above-ground storage tanks are supported generally by concrete piers. From a design standpoint the storage container may be considered as a beam if the tank has been constructed by fusion welding. The beam is adequately supported if only two piers are used.

From a theoretical standpoint it is desirable to place the piers as close to the end as possible in order to secure the reinforcement effect of the end. A strain gauge study made by a large tank fabricator indicated that placing the piers back to a position of ¼ of the length from the end did not produce excessive stresses in the tank. If more than two piers are employed, it is necessary that each pier be constructed and maintained in absolute perfect alignment. Because of the almost impossibility of securing this continued perfect alignment use of more than two piers may actually cause an excessive amount of tank weight to be carried by one pier, thus creating a potential hazard.

Based on studies made of the maximum liquid temperature measured in storage tanks, the LPG industry has determined the minimum working pressure of a container, other than ICC, should be the maximum vapor pressure at 100° F of the product to be stored in the container. It has been assumed further that this design working pressure is based on a construction factor of safety of five. If a safety factor of four is employed in the frabrication of the container the design working pressure is increased 25 percent above the maximum vapor pressure at 100° F of the product to be stored in the container.

It is customary further to assume that the vapor pressure of commercial propane at 100° F is 200 pounds per square inch gauge (psig) although the vapor pressure of pure propane is only 174 psig at this temperature. On the other hand pure propylene has a vapor pressure at 100° F of 211 psig.

It is customary today generally to install containers suitable for propane al-

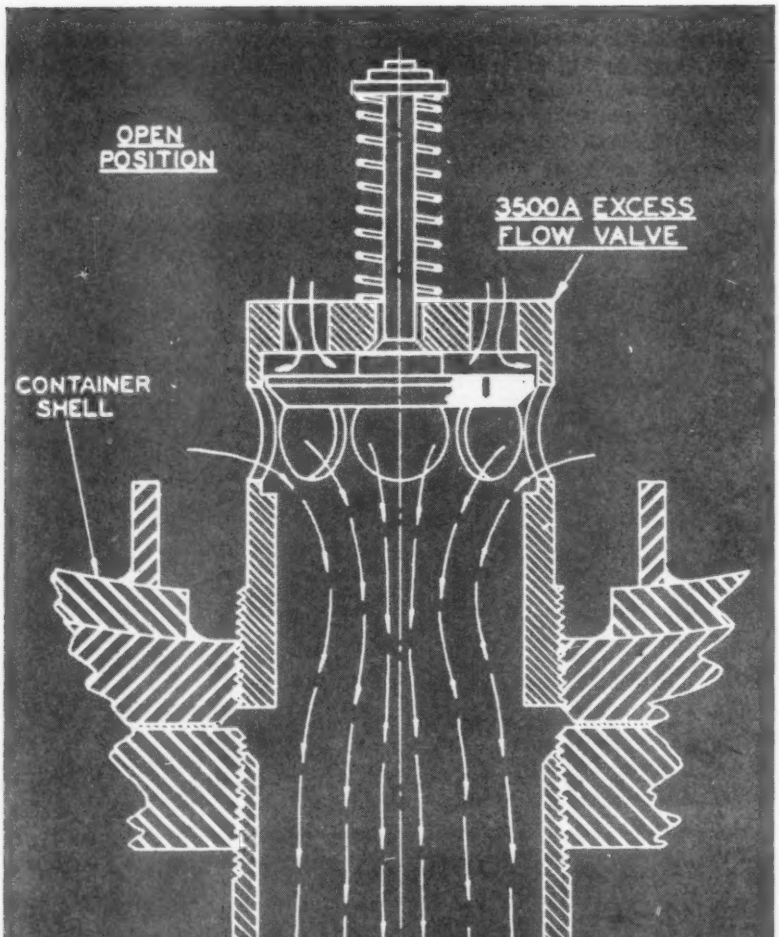


Figure 3. All openings from an LPG container except the relief valve and gauging device openings should be protected with an excess flow valve such as the one shown above in the open position

though a product with a lower vapor pressure may be procurable at certain times.

To insure maximum safety it is necessary that all containers except those constructed under ICC Specifications, bear ASME or API-ASME Code Symbol indicating that they have been constructed according to the minimum requirements of one of the Unfired Pressure Vessel Codes. If a code tank is used and if adequate relief valves are provided, the container may be considered as the safest part of a LPG installation.

To insure a safe LPG installation it is necessary that the container be provided with appurtenances which will insure the maximum amount of protection. It is essential that the valves, pipings and fittings be suitable and properly installed. While it is not necessary to locate the various openings in a manhole cover, nevertheless, such a procedure permits the minimum number of openings in the container shell, in addition to the manhole nozzle, and permits grouping most of valves and piping in one area which can be easily protected if necessary.

One of the most important fittings on a LPG container is the relief valve. Since the designed working pressure of LPG containers is higher than the maximum vapor pressure of the product in the container for the highest temperature which will normally be encountered, the relief valve should not be called upon to operate because of variations in normal operating conditions.

The primary purpose of the relief valve is to take care of emergency conditions such as would exist if an external fire was located around the container. The relief valve requirement is computed according to a formula developed by Mr. Fetterly, an inspector of the Bureau of Explosives, after considerable study and experimental work.

According to Fetterly's formula it is assumed that the exterior surface of an LPG container is exposed to the temperature of 1200° F. After years of experience the liquefied petroleum gas industry modified Fetterly's formula slightly by assuming that the temperature to which the exterior surface was exposed gradually decreased from 1200° F to 1000° F for containers whose size increased from 10,000 gallons water capacity to 30,000 gallons water capacity. The reason for the reduced exterior temperature for the larger containers is the improbability of larger containers being completely enveloped in a fire.

Since the quantity of LPG which may pass through the relief valve is a function of the construction of the valve, it is now required generally that the actual flow capacity of the relief valve be determined. This flow capacity is stamped on the relief valve body.

It has been the custom of the liquefied petroleum gas industry to set relief valves to start to discharge at a pressure not greater than the equivalent design working pressure of the container based on a factor of safety of four. In other words in the case of a propane container which was constructed with a factor of safety of five for 200 psig, the maximum start to discharge pressure of the relief valve would be 250 psig. On the other hand the same container for propane constructed with the factor of safety

of four would have a designed working pressure of 250 pounds and the maximum start to discharge setting of the relief valve still would be 250 psig or design working pressure of the container.

The liquefied petroleum gas industry further permits the relief valve to be wide open at an over pressure of 20 per cent above the designed working pressure of the container based on the factor of safety of four. In the case of a propane container the maximum pressure would be 120 percent of 250 psig or 300 psig.

The discharge from relief valves on stationary containers with a water capacity of more than 2,000 gallons must be at a point at least ten feet above the top of the container. The velocity of the LPG being discharged from a relief valve riser is generally such that it disperses readily into the air and offers no hazards. In order to keep rain and snow from entering the riser and accumulating on top of the relief valve a loosely fitting protective cap is placed generally on top of the riser.

Relief valve

If the relief valve opens the pressure of the discharge gases is sufficient to blow the rain cap off the top of the riser. The chain attached to the rain cap keeps it from being lost. Frequently various types of diverters or caps are placed on the outlet of the riser, in place of the rain cap. No fitting should be attached to the riser outlet which will restrict the gas flow or which will divert the flow back towards the ground.

After a relief valve has closed, the rain cap or protective covering should be replaced as soon as possible. Although a drain hole is provided in the bottom of the riser to drain off liquids which might accumulate inside the riser, the presence of moisture frequently will result in scale formation which may interfere with the operation of the relief valve.

All openings from a container except the relief valve and gauging device openings should be protected with an excess flow valve such as that shown in the open position in Figure 3. If the line is ruptured the excess flow valve will close resulting in a loss of only the contents of the line beyond the excess flow valve.

To open an excess flow valve which has closed, it is necessary to close a shut-off valve in the piping on the outlet side of the excess flow valve. A No. 54 drill hole is placed in the valve plunger which permits a slight leakage of LPG from the container into the line. By closing the valve on the outlet side, pressure will build up until a point is reached where the pressure plus the force of the spring equals the upstream pressure. At this point the valve will open.

It is essential that the proper spring be employed in excess flow valves. If the spring does not exert sufficient force, the excess flow valve may close prematurely during a heavy load. This would result in some inconvenience as it takes time to again open the valve. On the other hand, if the spring force is too large a line breakage will result in a flow insufficient to close the plunger.

Use of the excess flow valve has been highly successful in LPG containers. When ordering an excess flow valve, it is necessary that its installed position be known, since the closing rates for the same spring vary depending on whether it is in a horizontal or vertical position and if in a vertical position whether the flow is up or down. Likewise, care must be exercised to make sure that the excess flow valve is installed with the arrow indicating correctly the direction of flow.

It is advisable generally to test the operation of all excess flow valves before placing LPG in a new container. This can be done by pressuring the container by air. Furthermore it is advisable to check the operation of the excess flow valve periodically by opening a valve at the end of the line in which the valve is installed. Obviously if the line size is reduced, a smaller excess flow valve should be installed at the point of reduction since the line capacity of the reduced pipe size is insufficient generally to operate the excess flow valve installed in the larger line.

To assist in determining when a tank car or tank truck has been unloaded completely a sight flow glass should be installed in the liquid unloading line.

Fire fighting equipment

The precautions to be used in handling LPG in vapor form are similar to those required for any other commercial fuel gas. It should be remembered however that the gas even when mixed with air is heavier than air, and that its lower inflammable limit is lower than for most other commercial fuel gases. It is possible therefore for the gas to remain closer to the floor and form an inflammable mixture sooner than in the case of most other fuel gases.

If a leak develops, every effort should be made first to remove all sources of ignition within a reasonable distance. Increased dissipation of the gas into the air can be induced by increasing air circulation. Frequently, in the open, this can be accomplished by directing a stream of water into the gas area.

Major decision

If gas from a leak is ignited, the first major decision to be made is whether the fire should be extinguished or merely controlled. If it appears possible to stop the gas leakage by closing the valve it may be desirable to extinguish the fire in a minimum length of time. On the other hand if it appears uncertain or doubtful that the source of leakage can be stopped, it may be desirable to control the fire without attempting to extinguish it, permitting the gas to be completely consumed from the container. It should be remembered that in general a fire is controllable within certain limits while an explosion resulting from an accumulation of gas is not controllable and may do a great deal more damage than that caused by a fire.

If a fire occurs near an LPG container the prime consideration should be to stop the leakage. If the fire is of sufficient magnitude so as to heat the metal of a container in the vapor space appreciably it is desirable to cool the top of the container with water. Normally as long as any liquid remains in the container the heat required to vaporize the LPG is sufficient to keep the metal temperature from becoming dangerously high.

A relief valve is set to close at some minimum pressure. This pressure is maintained in the container by the relief valve regardless of whether liquid is present or not. If the metal temperature becomes high enough it is possible for its strength to be reduced to a point where it can no longer hold the pressure. Under this condition the container may rupture. Such a failure may only result in a small opening or split appearing in the container thus relieving the gas pressure or the container may completely rupture. The result of such a rupture, however, is generally not very severe since only gas is in the container.

Since a relief valve will close when the pressure in the container is reduced somewhat below the popping pressure, no attempt *(Continued on page 48)*

Industry news

Oklahoma gas men elect 1949 president

MALCOLM MORRISSON, assistant to the president, Oklahoma Gas & Electric Co., Oklahoma City, has been named president of the Oklahoma Utilities Association for 1949. The group will hold its annual conference in Tulsa, March 17 and 18.

D. W. Reeves, general sales manager, Oklahoma Natural Gas Co., Tulsa, will serve as first vice-president of the association; C. N. Robinson, vice-president, Public Service Co. of Oklahoma, Tulsa, is the new second vice-president, and H. H. Ferrin, treasurer, Oklahoma Gas & Electric Co., Oklahoma City, is treasurer. L. A. Farmer, president, Northern Oklahoma Gas Co., Ponca City, retiring president of the association, was elected a director.

Utilities streamline accounting methods

A NEW SERIES of Accounting Developments Service Bulletins has been compiled and distributed jointly by the Accounting Section of the American Gas Association and the Accounting Division of the Edison Electric Institute. These bulletins, by picture and text, bring to the accountants of member companies the latest developments in methods and procedures, machines and equipment, in public utility accounting practices.

Ideas that have been successful in various individual companies have been submitted to the joint committee, screened and the most valuable ones reproduced and distributed throughout both the gas and electric industries. For example, the current bulletin offers aids in collecting delinquent bills, billing merchandising installments, sequence sheets and route maps for meter readers, as well as illustrations and descriptions of new accounting equipment especially adapted to servicing utility accounts.

These developments bulletins will be issued periodically as member companies continue to be scoured for new ideas and ways of improving methods and procedures in the important field of customer contacts. Binders are priced at $2.50 each and may be ordered from Thomas J. Shanley, Secretary, Accounting Section, American Gas Association.

Sales conference plans progressing

PROGRAM plans are rapidly nearing completion for the 1949 American Gas Association Sales Conference on Industrial and Commercial Gas to be held in the Andrew Jackson Hotel, Nashville, Tennessee, April 5-7. The first day will be devoted to commercial gas subjects, while a general session will be held on the morning of the second day with concurrent symposiums during the afternoon. The last day's program will be devoted to industrial gas subjects.

An advance program is being prepared which will set forth directions for securing individual hotel reservations. Plan now to attend the conference—A PAR ACTIVITY.

I.G.T. training gas industry apprentices

In order to provide the gas industry with young men specially trained in its technology, the Institute of Gas Technology, Chicago, Ill., annually awards a number of fellowships to selected college graduates to pursue a two-year course leading to the Master's degree in Gas Technology or a four-year course leading to the degree of Doctor of Philosophy.

These functions include the prosecution of basic and applied research, graduate-level education in gas technology, collection and dissemination of technical information, stimulation and correlation of research.

Five new men and six second-year men are pursuing graduate studies in the fall term at I.G.T., J. D. Parent, educational director, reported recently. First-year men include Bertrand R. Bertrando, Ray E. Cooley, Clyde D. Hinman, John C. Pace, William T. Turner.

Mr. Bertrando is a 1948 chemistry graduate of the University of Illinois. Mr. Cooley is a 1948 chemistry graduate of Texas Tech. Mr. Hinman was graduated by Kansas State College in chemical engineering last June, and Mr. Pace is a 1948 graduate in chemical engineering from Texas Tech. Mr. Turner, the youngest of the group, has a B.S. in chemical engineering from Louisiana Polytechnic Institute.

This group will be joined at the mid-term by Paul A. Fedde and Sinesio A. Zagnoli. Mr. Fedde is now completing his requirements for the degree of B.S. in chemical engineering at the University of Colorado, while Mr. Zagnoli is a 1947 chemical engineering graduate of Purdue University, and spent last year with the Standard Oil Company of New Jersey in Venezuela.

The following fellows are completing their requirements for the degree of Master of Gas Technology this year: Robert W. Brooks (Purdue), John R. Brough (Mississippi), Frank H. Coley (Virginia Polytechnic Institute), Rex T. Ellington, Jr. (University of Colorado), Don E. Helbling (Illinois Institute of Technology) and Henry C. Owen, Jr. (Texas A & M). These men are expected to join the gas industry in June.

Fellows receive a graduated stipend beginning at $125 a month for the first year, in addition to free tuition and laboratory fees.

Cooperating member companies pay the fellows for work performed during the requisite summer employment training period. Fellows are selected from senior students and graduates in chemical engineering, chemistry, mechanical engineering, and related fields, on the basis of academic and personal qualifications.

Application forms may be obtained from the department chairman of the applicant's college or from the director, Institute of Gas Technology, Technology Center, Chicago 16.

(Standing, l. to r.) 1948-49 I. G. T. fellowship students: C. D. Hinman, J. C. Pace, S. A. Zagnoli, W. T. Turner, R. E. Cooley, H. C. Owen, Jr., J. R. Brough, R. T. Ellington, R. W. Brooks, F. H. Coley, D. E. Helbling. Institute officers (seated): E. S. Pettyjohn, director; F. H. Lerch, Jr., chairman of board; H. T. Heald, president; J. D. Parent, educational director. Another student, B. R. Bertrando, is not shown.

Second catalytic cracking plant installed

A NEW PEAK LOAD PLANT for fuel gas production has been placed in operation by the Consumers Gas Co., Reading, Pennsylvania. This installation, the second gas catalytic cracking plant to be installed in the United States, at present employs butane as a feedstock and has a capacity of five million cubic feet per day of coke oven gas substitute. Extensive research in catalytic reforming for the gas industry has been sponsored by the Gas Production Research Committee of the American Gas Association, E. G. Boyer, Philadelphia Electric Co., chairman.

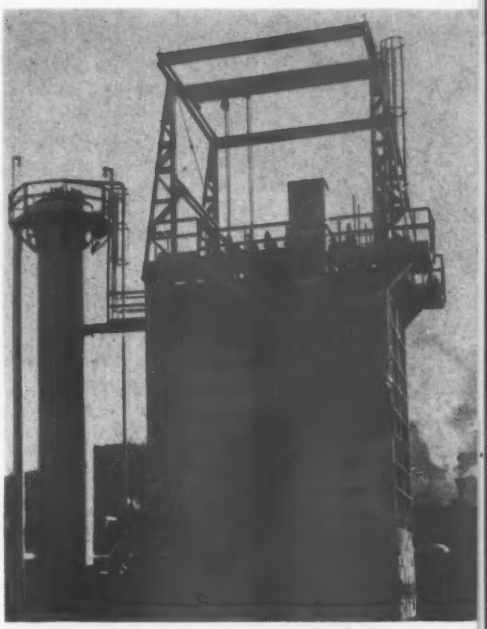
The plant was designed and built by Surface Combustion Corporation, Toledo, Ohio for The United Gas Improvement Co., parent organization of the Consumers Gas Company. The Reading installation is similar to that built for peak load shaving at the Riverhead Station of the Long Island Lighting Co. in January 1948. However, the end product of the process is a coke oven gas substitute rather than the water gas substitute produced at Long Island.

While the Long Island plant consists of three furnaces, each containing eight tubes of six inches inside diameter, the Reading installation consists of 32 tubes, eight inches inside diameter, in a single furnace. The larger total cross sectional area of the tubes results in an increased capacity so that the Reading plant can easily produce five million cubic feet of coke oven gas substitute. This gas has a heating value of 520 B.t.u. per cubic foot and a specific gravity of 0.52. It is completely interchangeable with the standard coke oven gas regularly supplied by Consumers Gas to its customers, without adjustment being necessary at any point in the mains or at the appliances. The process raw materials are air and steam in addition to the butane feedstock. Number 3 fuel oil is used for heating the catalytic cracking furnaces which operate at 1800° F.

The Reading plant is so designed that a wide range of alternative feed stocks may be employed to take advantage of market conditions. These feedstocks, in addition to the butane now used, include propane, natural gas, casinghead gasoline, straight run gasoline and ordinary cracked gasoline. When gasoline is used as a feedstock, a still is utilized which automatically distills the gasoline into three fractions, one of which is cracked in the reaction tubes; the second is used for enriching purposes while the third and heaviest fraction is used as fuel for the reaction tube furnace.

Present at the lighting up of the plant were Allyn C. Taylor, president, and William S. Bunnell, operating manager, Consumers Gas Co., Dr. E. H. Smoker, United Gas Improvement Co.; as well as Dr. C. C. Milbourne, W. E. Spengler and R. F. Weyburne, gas production division, Surface Combustion Corporation.

A plant practically identical to the Reading installation is being completed at the Harrisburg, Pennsylvania plant of The United Gas Improvement Company. A third identical plant is scheduled to be started up at the Allentown U.G.I. property on September 1, 1949. These two plants are also being constructed by Surface Combusion Corporation.



Close-up of new peak load plant installed by Consumers Gas Co. at Reading, Pennsylvania

Uses for steam table report outlined

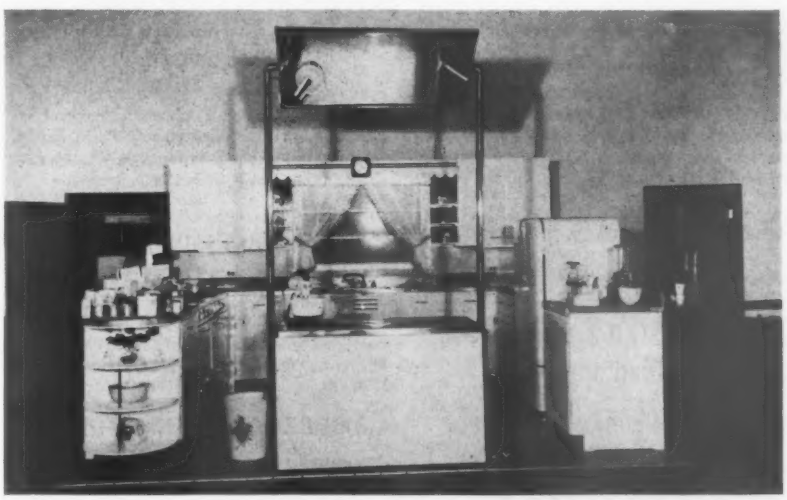
A PAR activity PRACTICAL design data designed to help commercial equipment manufacturers utilize gas fuel safely and efficiently, thereby strengthening the competitive position of gas, is contained in the American Gas Association Testing Laboratories Research Report No. 1112, "A Study of the Factors Affecting the Application of Gas to Counter Appliances (Steam Tables)." An earlier report in this series was issued in March 1948 dealing with coffee urns.

Further details on the steam table report are contained in the January 1949 A. G. A. MONTHLY. Gas utility company representatives should, whenever possible, advise equipment dealers, supply houses and manufacturers that these reports on steam tables and coffee urns are available.

In cases where a manufacturer is experiencing difficulty in the utilization of gas or interpreting data presented in these reports, it is suggested that he be invited to request the assistance of the Association's Utilization Bureau at A. G. A. Headquarters, 420 Lexington Ave., New York 17, N. Y. Also the Gas Appliance Manufacturers Asso. is equipped to circularize their membership whenever requests are received concerning the availability of suitable gas burners and control devices.

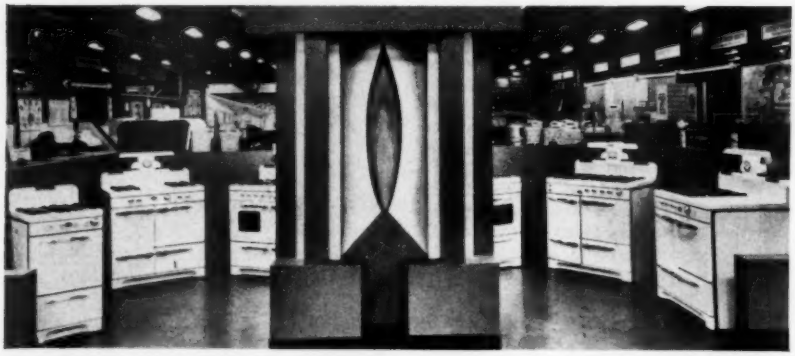
Commercial gas engineers should find these reports helpful for their own use where individual customers request information or complain of the inadequacy of their present equipment. For example, the recommended burner input rating for different sized urns and steam tables should be helpful, as should the data given on correct burner construction for various inputs and types of gas.

Baltimore portable kitchen



Portable kitchen used by Consolidated Gas Electric Light and Power Co. of Baltimore in neighborhood cooking school demonstrations. According to Mrs. Florence J. Neely, home service supervisor, a large increase in attendance has been noted since the kitchen was introduced

Crowds view Pennsylvania farm show



One corner of the extensive display of gas cooking and heating appliances coordinated by the Pennsylvania Gas Association at the Pennsylvania Farm Show in Harrisburg last month. Attendance at the farm show ran around six figures every day during the week of January 17, and good response in actual sales was reported by many of the farm and home equipment manufacturers who participated

Progress seen in gas conservation

GREAT strides are being made in gas conservation in Texas, Hines H. Baker, president, Humble Oil & Refining Co., affiliate of Standard Oil Co. (New Jersey), told the Rotary Club of Beaumont, Texas, January 5 during a program commemorating the forty-eighth anniversary of the discovery of the Spindletop oil field.

Mr. Baker said that the industry is spending 250 million dollars in Texas in a postwar gas conservation program to save nearly 2¼ billion cubic feet daily of casing-head gas produced with oil. He said that nearly 40 percent of this program has already been completed and that another 36 percent will be completed in 1949. The program involves the construction of 138 gas conservation plants, of which 82 have been completed, 43 are under construction, and 13 are planned for the near future.

He estimated that when the entire program is completed by 1950, the amount of casing-head gas conserved will be 90 percent or more of the maximum that can be utilized economically, compared with 70 percent currently being utilized. He commended especially the conservation efforts of the Texas Railroad Commission.

Lone Star starts new department

CREATION of a new department to be known as exploration and gas supply has been announced by Elmer F. Schmidt, vice-president, Lone Star Gas Co., Dallas, Texas. E. Allen Brown, superintendent of production, has been made manager of the new department.

Formation of the department was necessary in order to administer efficiently the increased activity connected with Lone Star's continued growth and expansion. Mr. Brown generally will direct and coordinate activities of the land, geological and production departments.

J. Paul Rogers has been advanced from assistant field supervisor of production to exploration engineer. Carl M. Hill has been advanced from chief production engineer to superintendent of production department, the position previously held by Mr. Brown. Other personnel changes are: M. O. Attebery, from field supervisor of production to assistant superintendent of production, and W. M. Burke, from assistant chief production engineer to chief production engineer.

A.G.A.
Home Service Workshop
in Cleveland, Ohio
January 24-27
Will be reported in the
March MONTHLY

New formula devised for gas pressure drops

A NEW FORMULA providing a good approximation of the pressure drops for gases flowing counter-current to moving granular beds is available to the gas industry in a thesis submitted to the University of Oklahoma Graduate College, Norman, Oklahoma. The work was prepared by Columbus Vandiver Mooney.

It is expected that the new formula will be of wide interest to persons in the natural gas industry who are interested in improving the design and construction of gas dehydration processes. This thesis may be borrowed through the inter-library loan service by applying to a local library with the author's permission.

Gettysburg gas assets transferred

THE NATURAL GAS SERVICE, properties and other assets of Gettysburg Gas Corporation were transferred January 1, 1949, to The Manufacturers Light and Heat Co., an associated company in the Pittsburgh Group of The Columbia Gas System, Inc.

Charles E. Bennett, president of the associated companies, indicated that there would be no change in gas company personnel, rates or operations. He stated that early dissolution of Gettysburg Gas Corporation would reduce from eight to seven the number of associated gas companies forming the Pittsburgh Group of The Columbia Gas System, Inc.

Gas Has Got It takes a plane trip

GAS HAS GOT IT has taken to the airways according to L. H. Ernst, Southeastern divisional sales manager, Caloric Stove Corp.

During a recent trip on a Delta Airliner Mr. Ernst learned that the hostess was about to be married and sold her a shiny new gas range. The hostess and her mother, who has used gas for years, are both completely sold on gas cooking. Mr. Ernst removed the Gas Has Got It button which he had received at the 1948 American Gas Association Convention, and the hostess pinned it on her uniform and wore it throughout the entire trip.

P.C.G.A. publishes its 1949 proceedings

PROCEEDINGS of the Pacific Coast Gas Association for the year 1948 have just been published. The 199-page volume was compiled and edited by Clifford Johnstone, P.C.G.A. managing director, and contains records of the West Coast association's business, accounting, manufacturers section, sales and advertising, and technical sessions throughout the year.

Combustion Engineering and Superheater merge

FOR PURPOSES of efficiency and simplification in corporate structure, Combustion Engineering Co., Inc. has merged with and into The Superheater Company. The surviving corporation will continue under the name Combustion Engineering—Superheater, Inc. There will be no change of address for Combustion Engineering Company's New York office or the company's plants.

A.G.A. natural gas agenda taking shape

SOME of the pressing problems facing the natural gas industry will be analyzed and discussed by qualified men in their respective fields when the Natural Gas Department of the American Gas Association holds its annual spring meeting at French Lick, Ind., on May 9 and 10.

An agenda that should interest every member of the natural gas industry has been arranged by the program committee, headed by its chairman, Elmer F. Schmidt, Lone Star Gas Co., Dallas, Texas. General sessions will be held both mornings starting at 9:30 and the afternoons will be devoted to open meetings of the Transmission, Production and Storage, and Accounting Committees.

As tentatively arranged, the first general session will include a discussion on "What's Ahead for Business"; "Progress in Flare Gas Conservation in Texas"; "What's New in Steel," and "Financing the Natural Gas Industry."

The second general session will be devoted mainly to a symposium on peak loads, with discussions on "Storage of Gas to Meet Peak Loads," including underground reservoirs, pipe batteries and propane-butane storage; and economics of peak load shaving by use of catalytic and thermal reforming of both light and heavy hydrocarbons.

Reservations should be made as soon as possible, direct to the French Lick Springs Hotel where the meeting will be held.

Underground storage royalty established

D. V. MEILLER and M. G. Markle, who are associated with the Public Service Co. of Northern Illinois in gas engineering work and who invented a system for the underground storage of natural gas under high pressure, have announced a policy which will make available to any prospective user of the system a license under their patent rights at a uniform royalty rate.

The royalty basis will be 60 cents per thousand cubic feet of gas storage capacity. Licenses will be granted to responsible parties who wish to install or have installed a high pressure gas storage system covered by their pending patent application.

The underground gas storage system developed by Mr. Meiller and Mr. Markle already has been used successfully in installations having a capacity of more than 95 million cubic feet of natural gas.

Coal gasification pilot plant opened

NEW PILOT PLANT facilities to study coal gasification and produce a suitable synthesis gas have been completed at Library, Pennsylvania. The plant, designed and built by Pittsburgh Consolidation Coal Company in cooperation with Standard Oil Development Company at a cost of more than $500,000, is the biggest step yet taken by the two firms in a joint research project on synthetic liquid fuels.

The Pittsburgh company originally announced that about 50 tons of coal a day would be consumed and yield around 2,400,000 cubic feet of gas suitable for synthesis work, nearly 50,000 cubic feet per ton. However, company engineers more recently indicated that the plant would be able to handle between 100 and 150 pounds of coal an hour, or less than two tons a day.

George H. Love, president, Pittsburgh Consolidation Coal Co., commenting on what was expected from the new pilot plant, said:

"At present there is no apparent economic justification for the investment of large sums in commercial facilities to convert coal into gasoline. But we must anticipate that the time will come when such conversions will be commercially justified, or necessary in the national interest.

"While growing energy demands are expected to increase the use of coal in solid form, establishment of new uses will add security to the industry's future. These things—to be ready for a national need, and to establish new markets for coal—are the objectives of our research, which we can't leave to others to do."

P.U.A.A. prepares for annual convention

P. U. A. A. meeting in Pittsburgh: (Sitting, l. to r.) L. Edwin Gill, Jr., New Orleans; Paul L. Penfield, Detroit; H. Briggs, Jr., P. U. A. A. president; John E. Canfield, Madison, Wisc.; F. I. Fairman, Lexington, Ky.; H. S. Metcalfe. (Standing) J. S. Spaulding, Los Angeles, Calif.; C. D. Lyon; W. G. Heren, St. Louis, Mo.; C. Fred Westin, Newark, N. J.; W. B. Hewson, Brooklyn; K. Fitzpatrick, Jr., Dayton, Ohio; E. R. Keller, Cincinnati, Ohio; J. E. Humphreys, Toledo, Ohio. Convention plans were completed

HERBERT BRIGGS, JR., president, Public Utilities Advertising Association, has announced that plans for the annual convention, June 20-21, in Cincinnati, were completed in Pittsburgh on January 6.

Paul L. Penfield, advertising manager, Detroit Edison Co., announced plans for the P.U.A.A. 1949 Better Copy Contest, the oldest advertising competition in the United States. Awards covering all phases of utility company advertising will be made to winners in each classification at the convention.

L. Edwin Gill, Jr., New Orleans Public Service, chairman of the membership committee, reported that 57 new members of gas and electric utilities and their advertising agencies had joined P.U.A.A., bringing present membership to 321.

Reports from Raymond W. Fenton, The Peoples Gas, Light & Coke Co., Chicago, chairman of the advertising exchange service, and C. Fred Westin, Public Service Electric & Gas Co., Newark, N. J., editor of the *P.U.A.A. Bulletin*, were heard. Mr. Fenton said that more than 300 outstanding advertisements from utilities throughout the country had been reproduced in magazine form and sent to all members during the year.

Metals society address

HENRY H. HEYN, sales manager for the heat-treat division, Surface Combustion Corp., Toledo, Ohio, is the featured speaker at a meeting of York Chapter, American Society for Metals, February 9 in York, Pennsylvania. Mr. Heyn will speak on the subject "Controlled Atmospheres and their Practical Applications."

This subject is of great importance to industrial gas men due to the extent to which gas-fired controlled atmosphere heat treating furnaces are being installed in factories throughout the country. Mr. Heyn is an active member of the Industrial and Commercial Gas Section, American Gas Association.

Commercial gas tools available

Mechanical book displayed by Arkansas-Louisiana Gas Company at recent convention of the Arkansas Restaurant Association. Equipment in this display was loaned by American Gas Association and is available through the A. G. A. Industrial & Commercial Gas Section at a small rental fee. Included is a scale-model restaurant kitchen, a mechanical book and two mechanical gas flames

How good are you as a boss?

Here's an Opportunity for Supervisors to Check Themselves and Learn Whether They Possess the Qualifications of "The Perfect Boss."

IT is a rather common practice for management to grade workers in various ways as a means of determining whether they measure up to certain qualifications. Not so common a practice is the grading of supervisory personnel; yet it is fully or even more important that "bosses" possess certain desirable traits and characteristics.

The Personnel Journal has published the following 32 qualifications of the "perfect boss," as presented from the employees' viewpoint.

Study the list carefully and grade yourself honestly. The result may be surprising!

1. Thoroughly understands the work you do.
2. Respects good work and good workmen.
3. Sets reasonable deadlines.
4. Gets his own work done on time.
5. Is careful to see that you work under good conditions.
6. Is easily accessible.
7. Is friendly.
8. Is sympathetic.
9. Is helpful.
10. Gives instructions in a considerate manner.
11. Gives clear, complete, definite instructions.
12. Impartial and consistent in making assignments.
13. Selects best-qualified employees for promotion.
14. Even tempered.
15. Just in dealing with your errors.
16. Controlled and impersonal when he criticizes you.
17. Reprimands in private.
18. Accepts full responsibility for his own errors.
19. Explains the purpose of the work you do.
20. Trains you despite pressure of other work.
21. Regularly and constructively criticizes your work.
22. Encourages questions and suggestions.
23. Gives you credit for your achievements.
24. Helps you set and reach higher goals of achievement.
25. Gives you more responsible work as you develop.
26. Shares responsibility through genuine collaboration on the job.
27. Helps you to build confidence in yourself.
28. Has confidence in himself.
29. Loyal to all subordinates.
30. Has broad vision.
31. Consistently sets a good example.
32. Tries to be a better supervisor.

—*"Burner Tips," Houston Natural Gas System*

Combustion chambers

(Continued from page 15)

in the combustion chamber thus becomes a problem of interest, not only in the heat transfer process but also in the equally important burner design and the combustion space requirement. It is possible to imagine cases where a perfectly satisfactory burner in one combustion chamber may produce excessive quantities of carbon monoxide in another because of undesirable burner or combustion chamber recirculation characteristics.

The discussion of flow conditions in the flame zone is a necessary prelude to an understanding of heat transfer by the flame. In a later article a procedure will be outlined based on the foregoing analysis whereby combustion chambers geometrically similar to the one in Figure 1 may be designed for desired length, heat input, efficiency, "hot spot" temperature, or flue gas outlet temperature.

Industrial relations

(Continued from page 15)

be of considerable help to executives considering the initiation of an employee suggestion plan, or those who would like to improve an existing plan. Among the topics discussed are: benefits derived from suggestion plans, basic features, policies, the suggestion organization, suggestion procedure, training supervisors, publicizing suggestions, awards, annual reports, savings, and employee inventions.

● **In a recent speech in the House of Commons, Mr. Ivor Thomas,** an influential member of the Labor Party, was highly critical of the course his Government is following. Among other things he discussed the productivity of people in industry. In his remarks, he compared output per manhour in the United Kingdom during the five years before the war with the corresponding figures for the United States. Making the allowance for the shorter working week in this country, he stated that output per manhour on the average was perhaps 2.8 times as high as in his country. In public utilities and communications, the ratio he gave was 2.35.

P. C. G. A. continues cooperative advertising

THE PACIFIC COAST GAS ASSOCIATION is entering its twenty-first year of cooperative advertising according to Clifford Johnstone, managing director. Mr. Johnstone disclosed that the P.C.G.A. cooperative advertising committee has approved a $70,000 budget for the new year to continue the successful publicity and advertising campaign of the past.

"Action program"

(Continued from page 4)

set forth by A.G.A.

(2) Provide utility and dealer outlets with promotional helps designed to do a more effective job of selling automatic gas water heaters, following the pattern set by A.G.A.

(3) Provide an effective product sales training course for salesmen. This training should aim to increase sales of automatic gas water heaters of adequate size.

(4) Help to make A.G.A. promotion campaigns more effective by obtaining the full participation of jobber, dealer, and utility outlets.

(5) Work out an effective way to overcome the increased electric competition in the new home market.

(6) Seek progressive improvement and simplification in the appearance of their automatic gas water heaters.

Play up the gas flame

The gas flame comes into its own in a new series of magazine advertisements sponsored by Cribben & Sexton Co., Chicago, Illinois. One of the advertisements in the series is shown above

New booklet shows advances in soldering

IN A NEW edition of the Tin Research Institute's handbook "Notes on Soldering," W. R. Lewis, B.Sc., reviews research and presents a compilation of facts of value to solderusers in many industries. Advances in soldering technique are discussed and the various forms of solder and methods of applying heat to the joints are described in outline.

"Notes on Soldering" also contains an adequate bibliography and a detailed scheme for the chemical analysis of tin-lead solders devised by Dr. J. W. Price.

This 88-page booklet, suitably illustrated with 47 photographs and diagrams, is available free of charge on application to the Tin Research Institute, Fraser Road, Greenford, Middlesex, England. Readers in the United States should apply to Dr. Bruce Gonser, The Battelle Memorial Institute, 505 King Avenue, Columbus 1, Ohio, U.S.A.

OBITUARY

Paul R. Johnson

long a prominent figure in the oil and gas industry, died at Independence, Kan., on December 17 following a heart attack sustained a week earlier.

At the time of his death and for more than 20 years preceeding that date Mr. Johnson had served as president, Union Gas System, Inc., and its producing subsidiary, Sagamore Oil & Gas Company.

He also was actively engaged as the directing head of a large and varied group of industrial concerns including companies in the creamery, alfalfa dehydration and ice business as well as in the distribution of liquefied petroleum and of gas appliances. He was a regular attendant at annual meetings of trade associations, including the American Gas Association of which he was a member.

R. O. Glascott

supervisor of domestic sales, The East Ohio Gas Co., Cleveland, died on January 6 following a brief illness.

Mr. Glascott attended Case Institute of Technology and joined The East Ohio sales department in 1934. He was a member of the American Gas Association.

During his career he served as salesman, manager of house heating sales, and from 1945 directed the gas company's activity in the domestic field.

He is survived by his wife, Anne McManus Glascott, former home service director at East Ohio in Cleveland.

Marshall S. Reeve

retired president of the Public Utilities Management Corp., N. Y., service company for an operating group of utilities, died January 5 in a Brooklyn hospital.

Mr. Reeve retired in 1947 after heading the corporation for many years. He also had been an officer and director of a number of concerns in the operating group, including American Gas & Power Co., Community Gas & Power Co., Minneapolis Gas Co., and others.

Surviving are his wife, Mrs. Bertha St. John Reeve, and two sisters, Mrs. Rena Carver and Mrs. Ida Harris.

Willard T. Bauer

manager of the rate and valuation department, Petroleum Advisers, Inc., a subsidiary of Cities Service Co., New York, N. Y., died January 5 at his home in South Orange, N. J. following a six-day illness. He was 60 years old.

Mr. Bauer was formerly active on the Rate Committee, American Gas Association, and was also a member of two Cities Service Company groups, the Sixty Club and the Doherty Men's Fraternity. He was widely known and respected among gas men throughout the country. Mr. Bauer graduated from Northwestern University and had served with Petroleum Advisers of the Cities Service organization since 1917.

He leaves his wife, Mrs. Mary Woodward Bauer; two daughters, Mrs. Emil V. Zecher, Easton, Pa., and Miss Patricia C., South Orange, N. J.; a brother, Charles, Newark, N. J., and a grandchild.

W. Wallace Kemp

president, The C. M. Kemp Mfg. Co., Baltimore, Md., died recently at his home in that city.

Mr. Kemp was president and chairman of the board of directors from 1912 and served in this capacity until his death. He had succeeded his father, Clarence M. Kemp, founder of the company which has pioneered in gas combustion, industrial heating and processing equipment.

Mr. Kemp was internationally known and was personally responsible for many developments relating to improved methods of singeing textiles, manufacture of tin cans, and for use in the automotive industry, steel mills, printing, petroleum, chemicals and allied industries.

One of the outstanding developments was the adaptation of the principle of immersion heating with premixed gas for the melting of type metal for linotype machines and stereotype metal pots. This equipment is in use in many newspaper plants throughout this country and Canada today. In this field he worked closely with the Committee on Industrial and Commercial Gas Research of the American Gas Association.

Mr. Kemp was an active member of the A. G. A. Industrial and Commercial Gas Section from the time of its organization.

Mitchell chairmans A.G.A. convention group

GEORGE F. MITCHELL, president, The Peoples Gas Light and Coke Co., Chicago, has been appointed chairman of the 1949 Convention Committee of the American Gas Association, according to an announcement by Robert W. Hendee, president of the Association and president, Colorado Interstate Gas Company. F. X. Mettenet, vice-president, The Peoples Gas Light and Coke Co., will serve as vice-chairman of the committee which will direct over-all arrangements of the thirty-first annual convention of A.G.A., to be held in Chicago, October 17-20, 1949.

Other members of the 1949 Convention Committee named by President Hendee are: LeRoy M. Edwards, vice-president and general manager, Pacific Lighting Corp., Los Angeles; F. L. Fairchild, president and general manager, The Sprague Meter Co., Bridgeport; Ralph L. Fletcher, president, Providence Gas Company, Providence, R. I.; N. Henry Gellert, president, Seattle Gas Co.; W. H. Ligon, president, Nashville Gas & Heating Co.; J French Robinson, president, The East Ohio Gas Co., Cleveland; A. H. Weyland, president and general manager, Arkansas Natural Gas Corp., Shreveport, Louisiana.

The A.G.A. Convention Committee is one of the Association's most important groups, Mr. Hendee pointed out. Upon its efforts depends the success of the annual meeting both from business and social viewpoints. A multitude of details ranging from planning for hotel reservations to the arrangement programs for general departmental and sectional sessions comprise the task to which the top executives on this committee will devote much personal time and efforts.

G. F. Mitchell

F. X. Mettenet

Personal and otherwise

Public Service changes announced

SIX PERSONNEL CHANGES in the gas department of Public Service Electric & Gas Co., Newark, N. J., have been announced by George H. Blake, president, effective January 1, 1949.

George K. Bachmann, superintendent of meters, Newark and State meter shops, has been made assistant general superintendent of meters. T. Roger Hobbis, superintendent of distribution in the Paterson district, has been named assistant engineer of distribution in the Passaic division.

John W. Wilson has been advanced from assistant superintendent of distribution in the Paterson district to superintendent of distribution in the same area. Joseph P. Costanza has been advanced from assistant to superintendent of distribution, Jersey City district, to assistant superintendent of distribution in that district.

Other changes were Harry V. Precheur, from foreman mechanic, Harrison Gas Works, to instrument engineer, State meter shop in Newark, and Warren G. Harding, from cadet engineer to assistant superintendent of distribution.

Dahlgren resigns from Compact Commission

E. G. Dahlgren

E. G. DAHLGREN, assistant secretary, Interstate Oil Compact Commission, has resigned, effective January 1, to become a consultant in Oklahoma City.

A geology graduate of the University of Wisconsin, Mr. Dahlgren served in the geological department of the Indian Territory Illuminating Oil Company until January 1931, when he joined the Oklahoma City Producers' Association. In 1933 he joined the oil and gas conservation department, Oklahoma Corporation Commission. In June 1937, he became director of the conservation division, Kansas State Corporation Commission at Wichita, and in August 1939, he was employed by the Securities and Exchange Commission in Washington, D. C., as an oil and gas valuation engineer. In August 1941, he became identified with the production division, Petroleum Administration for War.

In January 1942, he resigned to become technical secretary of the Research and Coordinating Committee, Interstate Oil Compact Commission, at Oklahoma City. Subsequently, he was made assistant secretary in charge of technical activities.

He is a member of the American Gas Association and is now serving as chairman, production review committee of the Petroleum Division, American Institute of Mining and Metallurgical Engineers.

Schmidt heads A.G.A. technical and research group

E. F. Schmidt

D. A. HULCY, chairman of the Natural Gas Department, American Gas Association, has announced the appointment of E. F. Schmidt, vice-president, Lone Star Gas Co., Dallas, Texas, as chairman of the Department's Technical and Research Committee. Mr. Schmidt replaces H. D. Hancock, president, Gas Advisers, Inc., New York, who resigned as chairman last October.

Mr. Schmidt has been a member of the A. G. A. Technical and Research Committee for several years, during which time he worked closely with Chairman Hancock, and is thoroughly familiar with projects now under way and the operations of the committee in suggesting long-range research to serve the public interest.

Other committee and subcommittee chairmen appointed by Mr. Hulcy include: Accounting—F. W. Peters, secretary and treasurer, Oklahoma Natural Gas Co., Tulsa; Transmission—F. A. Hough, vice-president and chief engineer, Southern Counties Gas Co., Los Angeles; Nitrogen Removal—H. J. Carson, vice-president, Nothern Natural Gas Co., Omaha; Pipeline—R. G. Strong, chief engineer, Natural Gas Pipeline Co. of America, Chicago. L. T. Potter, assistant to president, Lone Star Gas Co., was reappointed for another year as chairman, A. G. A. Production and Storage Committee.

Committees are now being organized by the various chairmen with representative membership from all sections of the country.

Cross promoted by two companies

J. C. CROSS has been elected treasurer and a director, Hope Natural Gas Co., Clarksburg, West Va., and The River Gas Co., Marietta, Ohio. He assumed the duties of treasurer on January 1, 1949.

Mr. Cross has been active on general accounting committees of the American Gas Association for several years and was chairman of the A. G. A. General Accounting Committee during 1947-48 Association year. He was first employed by Hope Natural Gas Company in March 1911 as an assistant district field clerk, later becoming a chief clerk.

In 1919 he was promoted to field accounting supervisor and was placed in charge of inventorying and reclassifying properties of Hope Natural Gas Company preparatory to the inception of the New State Regulatory Commission Code of Accounts which was later adopted by the various states. He later became assistant general accounting department head and in November 1922 was made chief accountant of the company. In February 1939 he was advanced to assistant treasurer of both companies.

J. C. Cross

Evans advanced by Equitable Gas

THOMAS H. EVANS has been appointed promotion manager, sales department, Equitable Gas Co., Pittsburgh, Pa., according to an announcement by Ward Perrott, president of the Company.

Mr. Evans attended the School of Business Administration, University of Pittsburgh and entered the employ of the company in June 1937 as a commercial heating salesman. Since then he has served as commercial salesman, commercial representative, supervisor of commercial heating sales, and manager of commercial speciality sales, the position he held at the time of his present appointment.

Mr. Perrott also announced the appointment of Walter C. Bomhoff as assistant manager of the company's planning and development department.

Mr. Bomhoff will be responsible for continuous studies of supply and demand, and the correlation of gas sales with the supplies available, in addition to general assistance in supervision of the department.

T. H. Evans

Two promoted by Hartford company

A. B. Hamilton

R. B. Barger

ARCHER B. HAMILTON has been appointed general superintendent in charge of all operating departments for The Hartford Gas Co., Hartford, Connecticut. Richard B. Barger has been named assistant general superintendent in charge of customer service and will act as general superintendent in Mr. Hamilton's absence.

Mr. Hamilton is a graduate of Sheffield Scientific School, Yale University, and has served Hartford Gas since July 1922. He is a member of the American Gas Association and the New England Gas Association.

Mr. Barger graduated from Johns Hopkins University in 1935 with a degree in engineering from the Gas Engineering School, and joined The Hartford Gas Company the same year as a cadet engineer. He became superintendent of customer service in 1945.

Mr. Barger is a director of the New England Gas Association operating division and past-chairman of the service managers' group. He is a member of the American Gas Association and chairman of the A.G.A. Sub-Committee on work on Consumers' Premises.

Englebright succeeds Winn at Honolulu

CUSTOMER SATISFACTION with the $1,500,000 construction program of Honolulu Gas Co., Ltd., Honolulu, Hawaii, is evidenced by constantly increasing sales and a 50 percent drop in the number of service calls between 1946 and 1948.

The program was initiated by John J. Winn, Jr. who moved to Honolulu in 1946 to take charge as vice-president and general manager. When Mr. Winn recently decided to return to the mainland, he recommended as a successor A. E. Englebright, the engineer who served as consultant during the rehabilitation program.

Mr. Englebright, formerly chief gas engineer for Ebasco Services Inc., New York, has been appointed to succeed Mr. Winn as vice-president and general manager.

Wills retires from Portland company

FRANK WILLS, engineer of production in the gas department, Pacific Gas and Electric Co., San Francisco, Calif., retired January 1 under the company's pension plan.

A member of the American Gas Association, Mr. Wills joined Pacific Gas and Electric in 1918. From 1920 to 1922 he was employed by the California Railroad Commission, returning to the utility in 1922.

Bowersox appointed by Coast Counties

GEORGE BOWERSOX has been appointed by Coast Counties Gas and Electric Company to fill a newly-created position as assistant regional manager of the Contra Costa Region. He will work directly with R. L. Hayden, vice-president and regional manager, in over-all administration of company policies and activities in Contra Costa County.

New Yorker receives McCarter medal

THE AMERICAN GAS ASSOCIATION'S coveted McCarter Medal and Certificate have been awarded to Patsy A. Tettie, Consolidated Edison Co. of New York, Inc., for an outstanding act of life saving. The medal is presented for the successful resuscitation of a person overcome by gas.

Florence Stove names general sales manager

C. FRED LUCAS has been appointed general sales manager of Florence Stove Company to succeed Robert H. Taylor who was recently elected president. Mr. Lucas has been sales manager of the southern division, and will make his new headquarters at the Gardner, Mass., plant.

C. Fred Lucas

A graduate of the University of Pittsburgh, he has had 17 years' experience in sales management and promotion with the Florence company and with Westinghouse Electric Corporation.

Laclede appoints new vice-president

HENRY A. EDDINS has been elected vice-president, The Laclede Gas Light Co., St. Louis, Mo., according to an announcement by Robert W. Otto, president.

A graduate of Texas A & M College, Mr. Eddins was associated with Stone & Webster Corporation and affiliated companies from 1931 until he joined Laclede, except for military service in World War II. He accepted a position as assistant to the president of Laclede on January 1, 1948.

During his utility career he has obtained experience in construction, rates, sales, engineering, finance, re-organization and management involving manufactured and natural gas companies.

H. A. Eddins

Bryant Heater names advertising head

IN LINE with an expanding advertising program, Howard A. Kennedy has been named advertising manager for consumer products, by Bryant Heater Co., Cleveland, Ohio. He succeeds Fred O. Habegger who recently became sales manager, Bryant-Williams Company.

A graduate of Ohio Northern University, Mr. Kennedy has had a long and varied experience in the advertising field. He was formerly an associate account executive with Fuller & Smith & Ross.

In his new capacity he will coordinate Bryant Heater's various advertising efforts, working closely with the market research and sales promotion departments.

H. A. Kennedy

Brockton company names manager

ELECTION of A. D. Matarese, vice-president, Brockton Gas Light Co., Brockton, Mass., as a director and general manager of the company took place at the 1949 organizational meeting of the directors on January 5.

Mr. Matarese, a graduate of Massachusetts Institute of Technology, joined the Brockton Gas Light Company as a student engineer in 1926. He was named manager in 1935 and elected a vice-president a year ago.

The company serves approximately 30,000 customers in a 360-square-mile area of southeastern Massachusetts.

A. D. Matarese

Sorby Roper director

E. CARL SORBY, vice-president, George D. Roper Corp., Rockford, Ill., has been elected to the company's board of directors. Stanley H. Hobson was re-elected president of the range firm.

Mr. Sorby holds important committee memberships in the American Gas Association, Gas Appliance Manufacturers Association, and Liquefied Petroleum Gas Association. He long has been outstanding in gas industry promotional activities.

Controllers honor Rodey

BERNARD S. RODEY, JR., Consolidated Edison Co. of New York, Inc., has been elected president of the New York City Control, Controllers Institute of America, for the remainder of the present term. He has been a vice-president of the Control since June 1947 and is chairman of the technical committees.

Mr. Rodey has been active in the affairs of the Control since he joined The Institute in 1940. He is currently serving as chairman, Taxation Accounting Committee, American Gas Association.

New Schoenberger head

C. S. STUCKENHOLT was elected president of The W. J. Schoenberger Co., Cleveland, Ohio, during a directors meeting at the plant of the parent company, Bell Aircraft Corporation. W. J. Schoenberger has resigned the post as president which he had held since 1922.

Mr. Stuckenholt has been vice-president in charge of sales since 1942. A graduate of Case Institute of Technology, he joined the company in 1936 following 11 years with the American Gas Association Testing Laboratories.

Hot water

(Continued from page 9)

The former depends chiefly upon the following factors: (1) distance from the source of hot water to the washer; (2) diameter of the conduit pipe; and (3) composition of the conduit.

Temperature losses occurring from the point of entry in the washer to the wetting of the fabrics depend upon the weight and type of the fabrics and upon whether or not they are wet or dry. Considerably heavier losses occur when hot water comes in contact with wet than with dry fabrics. Hence, except for a pre-treatment of fabrics carrying blood or other albuminous stains which are made difficultly soluble in high temperature washing, the washing cycle should begin with hot water and with a detergent present. Stained fabrics of the type mentioned above should be treated separately from the regular washing for best over-all efficiency.

With the present heating devices, water at 160°F can be secured in laundry washing equipment, and this is a recommended temperature for the detergency operations.

Whereas a time of ten to 20 minutes in the detergency bath at 160°F will give the best practical results (with 180°F eliminated because water of this temperature at the source will fall approximately to 160°F during transport and entry into the washing device, and because this temperature is not desirable if a bleach-sterilizing agent is to be used), one such bath will not give the best results if it constitutes the sole detergency treatment in the cycle. The time and temperature combination mentioned gives the optimum combination of factors during one continuous washing operation. A new supply of water and a new supply of detergent at the optimum concentration, temperature, and time combinations vastly will improve soil removal and whiteness results.

With the exception of blood and other albuminous stains, the higher the temperature the better the stain removal.

There is some mechanical action in all washing machines, whether they be of the large-scale type used in institutional and commercial laundries, or those of the various types used in the home. If there were no mechanical action there would be no soil removal. The loss of

strength of fabrics from the mechanical action of laundering however is negligible. Contrary to the common opinion that the mechanics of washing wear out textile fabrics, losses from this cause rarely are as high as 10.0 percent on 50 repeated launderings. The abrasion resulting from wear, on the other hand, causes far greater damage; and loss of strength frequently has resulted from intervening wear.

Bleach important

The greatest factor leading to a breakdown of textile fabrics during the laundry operation is chlorine bleach. Since this product is important in laundering because of its sterilization and stain removal values, chemists at the Ellen H. Richards Institute, The Pennsylvania State College, have spent many years in studying the conditions under which this substance may be used in the laundry process without marked damage to the fabrics being laundered. Fortunately, the removal of stains and the performance of the function of sterilization are not antagonistic to good strength perservation if the bleach solution is used under conditions of strict control.

If either the housewife or the laundryman fails to exercise the proper care in the use of chlorine bleach, heavy strength losses will result.

Fortunately, it is possible to maintain the optimum bleaching conditions without impairment of the stain removal or sterilization functions of the bleach, as stated.

Addition of chlorine bleach solutions in home laundry processes almost invariably follows a haphazard procedure with high resulting strength losses. In institutional and commercial laundries in which carefully standardized procedures are followed, the addition of chlorine bleach is made under controlled conditions. The Pennsylvania certified commercial laundries maintain an annual breaking strength loss of less than 15 percent on 50 repeated launderings in contrast with losses as high as 75 percent observed in some household procedures with the same test fabrics as those used by the former.

Table 1 gives pertinent data from trials in commercial laundry plants showing that stain removal and sterility are not furthered by use of chlorine (added as sodium hypochlorite) solutions beyond the recommended level, whereas fabric strength losses on 50 consecutive washings with the same test piece show drastic increases with increased chlorine concentrations.

Following are conditions for the proper use of bleach:

(1) *A low concentration of bleach should be used.* The concentration never should exceed two quarts of one percent bleach solution per 100 pounds of textile fabrics. One or 1.5 quarts will do a good stain removal and sterilization job while causing no notable strength losses if the other conditions are proper.

(2) *Chlorine bleach should not be applied at too high a temperature.* The temperature of the bleach bath should never exceed 160°F, and preferably it should be maintained at 140° to 145°F through this operation.

(3) *Bleaching should be done at a high pH.* Thus it should be carried out invariably in a soap bath (preferably in a bath of a built soap), never in water alone.

Whether washing is done under high controlled laboratory conditions or in home or power equipment, increases in water temperature were accompanied by increases in removal of oily carbon black soil, of clay soil, and of stains selected to represent those commonly found in the household. An exception was found in blood and other albuminous stains, the removal of which requires water at low temperatures. Special handling of these stains therefore is recommended.

There is an optimum concentration of detergent and an optimum time for one detergency bath beyond which results become poorer. The proper combination of detergent concentration, time for one detergent bath, and water temperature are required for maximum soil removal.

High temperatures and other optimum conditions were found to be required for proper sterility.

Multiple detergency baths, or a sequence of two or more detergency treatments—each under optimum conditions of detergent concentration, time and temperature—gave far better results than one detergency bath alone.

Optimum results

Whereas the figures of this abstract were based on trials with water of zero grain hardness, concentrations of detergents and changes in other factors were required for optimum results with hard water but the same temperature findings pertained.

The five-year study was conducted under the author's direction by J. Fred Oesterling, Joseph C. Sherrill, Harriet Carson, Marion Fleming, and Eileen Casey. The study was assisted by grants-in-aid by Ruud Manufacturing Co., the Pennsylvania Laundryowners Association, and the Diaper Service Institute of America.

TABLE 1—STAIN REMOVAL RATINGS, STERILITY, AND BREAKING STRENGTH LOSS IN RELATION TO CHLORINE CONCENTRATION IN LAUNDERING

Temperature—Not in excess of 160° F. pH 9.0 to 9.5 (built soap solutions in bleaching operation)
Number of plants upon which the data are based = 101

Bleach Concentration in Plants	*Average Stain Removal Score of the Plants on 18 Common Stains (Highest Score 1.0, Lowest 4.0) (One Washing)*	*Average Sterility Rating for These Conditions (Laboratory Tests)*	*Average Breaking Strength Loss of the Plants on 50 Washings*
Average of plants using from 1.0 to 2.0 quarts of 1.0% available chlorine per 100 pounds of fabrics	1.96	100.0%	7.6%
Average of plants using from 2.1 to 3.0 quarts	1.98	100.0	18.2
Average of plants using from 3.1 to 4.0 quarts	1.81	100.0	31.3
Average of plants using from 4.1 to 7.0 quarts	1.78	100.0	52.5

TABLE IV—*Analysis of Oil Gas*

Conradson carbon content of oil used, percent	.20			3.16			6.02		
	Weighted average of analyses on samples taken during entire test	*Spot Sample U.S. Steel Apparatus*	*Spot Sample Mass Spectrometer Apparatus*	*Weighted average of analyses on samples taken during entire test*	*Spot Sample U.S. Steel Apparatus*	*Spot Sample Mass Spectrometer Apparatus*	*Weighted average of analyses on samples taken during entire test*	*Spot Sample U.S. Steel Apparatus*	*Spot Sample Mass Spectrometer Apparatus*
CO_2	4.1			5.8	5.8	5.8	6.4	5.6	5.8
Illuminants	27.1			21.0	19.7	20.4	25.9	28.1	30.5
O_2	0.4	None		0.4	0.2	0.2	0.5	0.3	0.1
CO	0.7	sent		1.5	2.1	2.8	0.8	0.8	2.6
Paraffins	39.7	to Bureau		31.6	29.1	28.1	33.3	32.6	27.4
H_2	17.2	of Standards		19.0	21.4	22.3	13.4	10.6	11.9
N_2	10.8			20.7	21.7	20.4	19.7	22.0	21.8
B.t.u. (Thomas Calorimeter)	1088			900	885	885	970	998	998
Specific Gravity (Ranarex)	.814			.811	.817	.817	.882	.915	.915

Twin generator

(Continued from page 22)

shown in Table III. All analyses were made on the dehydrated tar and do not include the light oils recovered during tar dehydration. If these light oils are remixed with the tar, the specific gravity and free carbon contents will be reduced.

Analyses of the gas produced are shown in Table IV. The analyses headed "U. S. Steel Apparatus" were made in our own laboratory. When making these analyses difficulty was encountered in getting complete removal of the "illuminants" fraction because the U. S. Steel Apparatus is not suitable for analyzing gases having high "illuminants" content and therefore the percent "illuminants" reported is low. This in turn caused the percent "paraffins", determined by combustion, to be high. For comparative purposes a few samples were sent to the Bureau of Standards in Washington for analysis on the mass spectrometer. The results of these analyses are shown together with our analyses of the same spot samples.

TABLE V—*General Summary*

Test Data:			
Conradson carbon content of oil used, percent	.20	3.16	6.02
Gas volume, M.c.f.	18778	12579	27011
B.t.u.	1088	900	970
Specific gravity	.814	.811	.882
Heat oil, gals.:			
No. 1 Generator	20200	5170	12341
No. 2 Generator	14373	6072	11070
Total	34573	11242	23411
Make oil, gals.:			
No. 1 Generator	118957	72124	162149
No. 2 Generator	114374	71696	162512
Total	233331	143820	324661
Heavy tar, gals.	49615	30065	69394
Light oil from tar, gals.	3914	4140	8472
Runs made	1533	1224	2855
Operating hours	102.25	81.58	190.67
Temperatures:			
No. 1 Generator, °F	1715	1312	1499
No. 2 Generator, °F	1766	1552	1570
Bottom of Superheater, °F	1526	1567	1542
Top of Superheater, °F	1570	1652	1574
Oil to Generators, °F	77	79	82
H_2S, grains per 100 c.f.	206	265	262
Organic sulfur, grains per 100 c.f.	20.6	24.5	20.5
Gums, grams per M.M.c.f.	196.8	312.3	259.8
NO grams per M.M.c.f.	0.5	0.6	0.5
Light oil in gas, gals. per MCF:			
Condensed with dry ice	1.371	1.295	1.416
Condensed at 32 °F	.201	.578	.279

TABLE VI—*Operating Cycle—Time in Seconds*

Conradson carbon content of oil used, percent	.20	3.16	6.02
Blast valves open	0	0	0
Stack opens	10	15	14
No. 1 heat oil opens	18	69	59
No. 1 heat oil closes	126	105	104
No. 2 heat oil opens	21	31	39
No. 2 heat oil closes	126	72	84
Blast valves close	129	116	118
Stack closes	129	116	120
Steam opens	132	121	124
Make oil opens	141	127	130
Make oil closes	228	204	198
Steam closes	237	238	240

TABLE VII—*Blast Gas Analyses*

Conradson carbon content of oil used, percent	.20	3.16	6.02
Blast gases at bottom of superheater			
CO_2	10.4	10.6	9.6
O_2	6.2	5.7	7.4
CO	0.0	0.3	0.2
Blast gases at top of superheater			
CO_2	11.5	12.5	11.6
O_2	4.8	3.5	5.0
CO	0.1	0.2	0.2

Income tax depreciation

(Continued from page 26)

their net income. If LIFO depreciation were to increase these depreciation charges, a substantial reduction would follow in both electric and gas net incomes. Under these conditions, the decision to use LIFO would first involve an acceptance of a drastic cut in net income. The other alternative would be to petition for materially higher rates solely to cover the increased depreciation expense.

Because LIFO would increase depreciation deductions at the present time and leave smaller amounts of depreciable property costs to be recovered in the future, LIFO has approximately the same effect as many of the proposals for accelerated depreciation which have been made during the past few years. Hence, we must give LIFO depreciation the same consideration that has been given to the anticipated results of accelerated depreciation, especially with respect to the effect on taxable income.

Depreciation deductions for utilities are large amounts, and in some instances approach in size the total net taxable income. Any proposal that would substantially increase depreciation and thereby reduce taxable income must squarely answer the question: Is it possible for utilities and other corporations to shift the incidence of taxation away from themselves at the present time? If the answer to this question is affirmative, it would seem that a more straightforward and less complicated approach than LIFO depreciation should be developed.

Story of gas change-over

(Continued from page 6)

Meter and regulator diaphragms will begin to dry out and the meters and regulators will begin to receive deposits of napthalene and iron rust which will seriously reduce revenues immediately.

To correct these conditions we find that oil fogging is very effective. Also, the use of carboseal is quite effective. Some meter companies supply a specially treated diaphragm to prevent drying out and mold formation. If the meters have not been changed out previously on reasonably short schedules it will be necessary to go to a meter change-out program.

After a few months these conditions disappear.

Anyone changing from manufactured or natural gas to any of the various uses of LP-gas probably will be faced with the problem of just what happens between the time a car of propane is paid for, unloaded, manufactured at the plant and metered at the customer's premises. These factors must be considered:

(1) Gallons billed
(2) Gallons transferred to storage
(3) Gallons used to produce 1,000 cubic feet of gas at the desired B.t.u.
(4) Gallons measured in storage.
(5) Vapor measured in storage.

From the above factors, it can be shown that accurate measurement can account for loss of gas left in tank car, and loss in thermal efficiencies when temperatures are low.

To control the thermal losses as the result of low temperatures, the use of a vaporizer is helpful. To recover practically all gas from the tank cars, a compressor type unloading pump is desirable. In two of our plants a liquid transfer pump is used, which of course does not recover the vapor. To accomplish this a separate vapor line is run from the tank car direct to the injectors and gas is made directly from the car into the holders, thereby recovering the residue gas.

To accurately control measurement, we believe it is important to know by the following instruments what is going on 24 hours in the day.

(1) An indicating and recording B.t.u. machine on the finished gas on the city.

(2) Temperature and pressure recorder on the gas stream on the city.

(3) Temperature and pressure recorder on the storage gas.

(4) Temperatures and pressures indicated before and after unloading tank cars.

(5) Recording and direct reading positive displacement meter in the undiluted vapor line.

Today there is a variety of plant designs from which to choose. We have employed the injector system which uses the inherent pressure of the propane to operate the automatic controls.

We use two stages of vapor regulation from the storage tanks to the point of gas-air mixing. Each stage of regulation has duplicate units with a third manually operated unit.

Different sized injectors are used, sized to handle variations in the load. We find it very important from the standpoint of uniform appliance behavior to employ recording B.t.u. and pressure instruments, for a variation in either will result in customer complaints.

Storage tanks with the approved accessories and trim are used to satisfy all safety requirements.

This is a factual story of what is involved in changing from a low B.t.u. gas to a high. If the problems are recognized and approached with proper respect and planning then the change-over can be made with profitable results.

PAR plan gains

(Continued from page 12)

utilities and range dealers in a unified, cooperative campaign.

The figures show that the aim was fulfilled. PAR funds were increased 50 percent, national ads of "CP" range producers tripled while local gas company and dealer advertising doubled. Only a few years ago the volume of electric range national advertising was three times that of gas ranges. In this fourth year, the report states, the cooperative unified range campaign resulted in $2,037,000 of gas range advertising as compared with $1,986,000 of electric range ads—and for the first time, gas range advertising was competitive with the volume of electric range national advertising.

During the year, nine manufacturers with national distribution spent $1,171,537 to advertise automatic "CP" ranges nationally while the A.G.A. chipped in $588,396, making a total of $1,759,933. The nine producers included Caloric, Estate, Grand, Magic Chef, Quality, Roper, SGE-Oriole, Tappan, Universal.

Four other manufacturers with regional distribution, Gaffers & Sattler, Glenwood, O'Keefe & Merritt and Western Stove, spent $509,315. When the A.G.A. came through with $78,674, the ante was raised to $587,989.

In addition, local gas range advertising by gas companies, manufacturers and dealers was estimated at $2,100,000, bringing the 1948 total for the "CP" campaign to $4,447,922 by all cooperating groups.

This was further increased by expenditures of about $3,500,000 in other forms of promotional activities, making a grand total of some eight million dollars, as mentioned, which was spent during the year on this coordinated drive on automatic gas ranges.

Next year, the fifth for PAR, will see its budget for national ads continued with the same amount available as for 1948—$800,000. The domestic gas advertising program will be run just as it was last year in behalf of automatic gas ranges.

The Association will continue to feature the manufacturer's range and carry his brand in its own advertising, in proportion to the total amount the manufacturer will again pledge to spend on magazine ads next year. To qualify for his share, the manufacturer will do a minimum amount of consumer advertising and will emphasize "the nine points of superior service." This year, the ranges will be shown in action, cooking food and the Servel refrigerator will be featured by name.

How successful all this coordinated activity has been can, perhaps, be best summarized by the observations of the electrical competition. In referring to the 1948 "Gas Has Got It" campaign, the general sales manager of an electric utility stated in a published article that the automatic gas range program was establishing a level of public acceptance that should knock the wind out of any complacent attitude of the electric utility industry. He called it "intelligently conceived, practically executed, aggressive and well financed."

New A.G.A. members

Manufacturer companies

Acme Equipment Co., Muskogee, Okla. (Curt Buddrus, president)
Bock Corp., Madison, Wisc. (O. L. Bock, president)
Downs Engineering Co., Springfield, Mass. (Thomas P. Downs, owner)
General American Transportation Corp., Chicago, Ill. (Harold D. Skyrm, general sales manager)
Holyoke Heater Corp., Springfield, Mass. (Minot R. Edwards, president)
Michigan Tank & Furnace Co., Dearborn, Mich. (L. F. Hess, secretary)
M. M. Hedges Manufacturing Co., Inc., Chattanooga, Tenn. (M. M. Hedges, president)
A. Turner, Ltd., Gloucester, England (A. Turner, proprietor)
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● If you don't like the way a bank treats you, it is easy to take your account somewhere else. If one store is hard to get along with, there is always another waiting to serve you. If one kind of coffee doesn't taste right, you simply change brands. But if people want to use gas, they have to buy it from us.

You see, people figure we are a monopoly. When something goes wrong, they're sort of stuck with us. If they get mad at us they can't change brands or do something equally quick and drastic—to ease their anger. That makes them madder still.

Actually, we do have competition. We could lose our business. And on top of that, our customers are far more critical of our service, because, when dealing with a utility, they carry a chip on their shoulder.

Our safety lies in courtesy always. A double dose of courtesy to every customer who has a bone to pick with us. Otherwise—come one fine day we wouldn't eat. We wouldn't have any business.—*G. A. Sass, Indianapolis.*

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1949

MARCH

14-15 •A. G. A. Eastern Natural Gas Regional Sales Conference, Residential Gas Section, William Penn Hotel, Pittsburgh, Pa.

17-18 •Oklahoma Utilities Association annual convention, Hotel Tulsa, Tulsa, Okla.

24-25 •New England Gas Association, annual meeting, Hotel Statler, Boston, Mass.

28-30 •A. G. A. Mid-West Regional Sales Conference, Residential Gas Section, Edgewater Beach Hotel, Chicago, Ill.

March 31-April 1 •A. G. A. Conference on Domestic Research and Utilization, Hotel Statler, Cleveland, Ohio

APRIL

4-6 •A. G. A. Distribution, Motor Vehicle and Corrosion Conference, Netherland Plaza Hotel, Cincinnati, Ohio

5-7 •A. G. A. Sales Conference on Industrial and Commercial Gas, Andrew Jackson Hotel, Nashville, Tenn.

5-7 •G. A. M. A. annual meeting, Broadmoor Hotel, Colorado Springs, Colo.

10-12 •Gas Meters Association of Florida-Georgia Annual Meeting, Ponce de Leon Hotel, St. Augustine, Fla.

11-13 •A. G. A.-E. E. I. Spring Accounting Conference, Hotel Book-Cadillac, Detroit, Mich.

11-13 •Mid-West Gas Association, forty-fourth annual convention, Hotel Fort Des Moines, Des Moines, Iowa

12-14 •Southwestern Gas Measurement Short Course, College of Engineering, University of Oklahoma, Norman, Okla.

20-22 •Southern Gas Association, annual convention, Buena Vista Hotel, Biloxi, Miss.

22 •The Maryland Utilities Association, annual meeting, Lord Baltimore Hotel, Baltimore, Md.

28-29 •Indiana Gas Association, annual convention, French Lick Springs Hotel, French Lick, Ind.

MAY

9-10 •A. G. A. Natural Gas Department Spring Meeting, French Lick Springs Hotel, French Lick, Ind.

9-13 •A. G. A. Industrial Gas School, Hotel Severin, Indianapolis, Ind.

17-19 •Pennsylvania Gas Association, annual convention, Galen Hall, Wernersville, Pa.

23-25 •A. G. A. Production and Chemical Conference, Hotel New Yorker, New York, N. Y.

26-27 •A. G. A.-P. C. G. A. Domestic Research and Utilization Conference, Ambassador Hotel, Los Angeles, Calif.

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SERVICES OFFERED

Sales Engineer—Manager: Ten years Industrial, Commercial, Heating experience; four years sales manager of 40,000 meter manufactured gas utility. Excellent public relations background. One whose interest is to foster good public relations, to keep existing services active, and to add profitable load. Married, excellent health. References available. (39). **1595.**

Well known **Engineer-Executive** available for consulting and advisory assignments as far as permanent situation. Thoroughly experienced in all phases of the manufactured gas business —management, production, distribution, service, rates, employee relations, publications, etc. Also experienced in natural gas. **1596.**

Manager-Engineer. Extensive training and experience in the operation of gas properties. Well versed in the production of carburetted water gas and propane air including conversions. Experience includes high and low pressure distribution, sales and commercial activities. College graduate with technical degree. Licensed engineer in Pennsylvania. **1597.**

Chemical Engineer, B.Ch.E. 1948 (cum laude), Tau Beta Pi; conscientious, ambitious, draft status 1C; Resigned out-of-town position to continue graduate studies in N.Y.C.; Desires full-time position within commuting distance Metropolitan Area. (25). **1598.**

Mechanical Engineer—University of Connecticut, 1923. Technical Consultant and Results Engineer Twenty-five years experience economic and engineering studies; planning research, site desirability, historical cost analysis of construction, valuation, continuing property records, depreciation, retirements, procurements and production, markets. Personnel, studies in power and light, gas, railroads, chemical and manufacturing plants. **1599.**

Eastern Sales Executive—With 20 years of outstanding results selling utilities, wants connection representative manufacturer of equipment for production, distribution or utilization of gas. Top references. **1600.**

Tax Accountant—15 years extensive experience in tax problems. Past five years exclusively with natural gas and oil working at top level in setting tax procedures and policies. Ability to work with personnel at all levels to produce efficient results. Location unimportant but desire southwest. Married. (38). **1601.**

Controller, Treasurer, Accounting and Financial **Executive**—Last four years Secretary-Controller Head Finance Division $80,000,000 utility. Previously eighteen years large utility system from Accountant to Assistant Controller of holding company. Relations with present employer excellent. Present salary $11,000. Graduate St. Lawrence University. Major economics. **1602.**

Selling to dealers and gas companies, with headquarters in Cincinnati representing high grade gas range lines or, **sales manager** in Cincinnati district with A1 rated bottled gas company. **1603.**

Senior Sales Engineer (college graduate)—with 20 years' experience in the utility field. Available as sales manager, assistant to executive or as gas appliance distributor. **1604.**

POSITIONS OPEN

Sales Engineer—Experienced in selling, installing and servicing industrial heating and ventilating equipment. To cover S.W. Connecticut. Car necessary. Commission plus expenses. All applications considered confidential. Write full details concerning experience, etc. **0543.**

Assistant Gas Engineer—To assist in general supervision of operation and maintenance natural gas distribution properties in Middle West. Should have technical education also experience operation and maintenance water gas plants. **0544.**

Experienced **Corrosion Engineer** for electrolysis and corrosion mitigation work with large midlewest Gas Company. Please write full details concerning experience and other pertinent data. **0545.**

Rate Consultant—Preferably graduate engineer, to develop rate structures for natural and manufactured gas; make studies of markets, competition and costs. Location New York; travel involved. Submit complete resume. **0546.**

Assistant Superintendent—Production—Eastern Utility 22,000 M cubic feet water gas plant. To handle plant operation, maintenance and construction. Should be graduate engineer and experienced in heavy oil operation. $7,500 per year to start. Rapid advancement and responsibility assured. Five years or more gas works experience essential and under 45 years old. Give qualifications in detail and age. **0547.**

Home Service Directors—For employment with a leading Liquefied Petroleum Gas marketing company with district offices in Indiana, Illinois, Kentucky, Ohio, Michigan, Pennsylvania, New York, New Jersey, and Maryland, requires 16 experienced home service directors, age 25 to 40 years. Choice of location. Accompany reply with photograph and full qualifications. Our employees know of this offer. **0548.**

Young technical graduate (not over thirty) with some experience in **water gas production** and distribution. Splendid opportunity assisting in supervision of production, distribution, and industrial gas applications. Location, Southern New England. Replies confidential. State experience, education and personal data. **0549.**

Arizona public utility seeks experienced **gas engineer** with executive ability for distribution system design, load forecasting and associated subjects. Permanent position and excellent opportunity. Give age, education and experience. **0550.**

LP safety requirements

(Continued from page 33)

should be made to extinguish a fire which may be burning at the outlet of the relief valve riser. Effort should be directed entirely to control the fire around the tank as this is the source of heat creating the pressure within the tank.

Installation of water hydrants at strategic points is generally desirable when five or more containers are installed in the same location. Likewise it is desirable to have one hydrant for approximately every ten containers. The hydrants should be so located that they will be accessible in case of fire and not closer than 25 to 50 feet of containers.

At each hydrant location there should be a hose cart with sufficient hose to permit placing water on the far end of the tanks in the immediate vicinity. The hose should be equipped with a combination fog nozzle. Likewise the hose cart should be protected from the weather by a suitable housing.

In addition to water protection, first aid fire extinguishers also should be provided. For installation of five or more containers at least one wheeled type extinguisher should be located in the tank area. If more than ten containers are in one location two wheeled type extinguishers should be provided. It is preferable to use the dry chemical type extinguishers.

Provision can be made in the housing for the hose cart at the hydrant to house also the wheeled first aid fire extinguishers. It is desirable to have the first aid fire extinguishers at the extreme ends of the storage area in order that a fire may be approached from either side.

Likewise in vaporizing houses, mixing houses, unloading racks, and filling plants first aid fire extinguishers should be provided. Hand extinguishers of the dry chemical type having a capacity of from 15 to 25 pounds should be used. These should be located on the outside of each building or at an unloading riser at a point where they are accessible.

Experience has demonstrated clearly that liquefied petroleum gases may be transported, stored, and used with utmost safety if sound engineering principles are employed in the design, construction and operation of the equipment required to handle this material.

TABLE I—LIMITS OF INFLAMMABILITY IN AIR

Gas	*Percent Gas In Air* Lower Limit	Higher Limit
Methane	5.00	15.00
Ethylene	2.75	28.00
Ethane	3.22	12.45
Propylene	2.00	11.10
Propane	2.37	9.50
Butylenes	1.70	9.00
Isobutane	1.80	8.44
n-Butane	1.86	8.41
Natural Gas	4.80	14.60
Coal Gas	5.60	30.8
Carburetted Water Gas	6.40	37.70
Carbon Monoxide	12.50	74.20
Hydrogen	4.00	74.20
Benzene	1.41	6.75

TABLE II—BOILING POINTS

Gas	*Boiling Point °F*
Methane	—258.9
Ethylene	—154.9
Ethane	—128.2
Propylene	— 53.8
Propane	— 43.7
Isobutylene	+ 19.2
Isobutane	+ 10.9
n-Butane	+ 31.1
Carbon Monoxide	—313.6
Hydrogen	—422.9

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